AMERICAN ANTIQUITY

VOLUME XVI
NUMBER 1
JULY 1950

PUBLISHED BY THE SOCIETY
FOR AMERICAN ARCHAEOLOGY

THE SOCIETY FOR AMERICAN ARCHAEOLOGY

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AMERICAN ANTIQUITY is printed by the George Banta Publishing Company, 450–454 Ahnaip Street, Menasha, Wisconsin, U.S.A.

Published by the SOCIETY FOR AMERICAN ARCHAEOLOGY, during the months of January, April, July, and October. Subscription by membership; annual dues of $6.00 includes quarterly issues of AMERICAN ANTIQUITY and other releases, as issued.

Entered as second-class matter July 22, 1935, at the post office at Menasha, Wisconsin, under the Act of March 3, 1879.

Proposed articles and contributions to "Facts and Comments" should be submitted to the Editor, Irving Rouse; publications for review, reviews, and material for "Notes and News," to the Associate Editor, James B. Griffin.

Subscriptions and orders for back issues or Memoirs should be addressed to the Treasurer, Glenn A. Black.

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AMERICAN ANTIQUITY

VOL. XVI JULY, 1950 No. 1

PRELIMINARY RESULTS OF ARCHAEOLOGICAL INVESTIGATIONS AT THE MOUTH OF THE AMAZON

CLIFFORD EVANS, JR. AND BETTY J. MEGGERS*

RECENT years have seen increasing archaeological research in South America, but little of it has been undertaken in the tropical forest regions. In an attempt to fill a portion of this gap we spent the period from July, 1948 to July, 1949 in archaeological survey and excavations on the Islands of Marajó, Mexiana, and Caviana in the mouth of the Amazon and in the Territory of Amapá (Brazilian Guiana).[1] At the close of the field work the material was analysed, classified, and described in Brazil, and compared with collections from the region not available in American museums. It is upon these preliminary studies and comparative analyses that the following discussion is based; and although the basic classifications and ceramic typologies will not be changed, some alterations in over-all conclusions may be made as the final report nears completion.

While field survey and stratigraphic excavations did not exhaust the sites in any one area, an effort was made to visit sites in all parts of an island and in all types of environment (coastal, inland, river, plain, and forest) to secure a reliable cross section of the various phases of occupation represented (Fig. 1). On Marajó 15 sites were excavated, of which one includes 21 and another 3 separate mounds. With the exception of three cemeteries belonging to the mound groups, all were occupation sites. Four village sites and five cemeteries were studied on Mexiana, and on Caviana nine village sites and five cemeteries were excavated. The distinct ceramic traditions represented at these sites indicated several different occupations on the islands in the mouth of the Amazon. In the hope that these might be explained as migrations from the Brazilian Guiana region, we extended our field excavations to the Territory of Amapá. However, intensive and extensive survey and excavation of 25 sites (13 occupation, 10 cemeteries, 2 temples) in the regions on both sides of the Rio Araguarí-Amparí, a large river which divides the Territory almost equally into northern and southern halves, produced evidence of only one of the groups previously encountered in the islands. The remaining ceramic traditions were completely different.

The sequence of occupations and migrations in the Lower Amazon region, as shown on the accompanying chart (Fig. 2), is based on archive data on the Aruã, which gives a terminal date, and on the seriation of all sites by means of the percentage changes through time of the ceramic types. Although the sites were shallow, sufficient change occurred in the ceramics, especially the plain wares, to permit the establishment of a sequence. Except in three cases the decorated wares comprise only 2–10 per cent of the total sherds from the occupation sites. (See Fig. 3 for selected examples.)

THE ISLANDS OF MARAJÓ, MEXIANA, CAVIANA

Ananatuba Phase. The first and possibly the oldest ceramic tradition on the north coast of Marajó was found at four sites (J-7, J-8, J-9, J-10). All were in patches of forest, typical of those scattered over the Marajó plains, and were not far from the coast near the banks of small streams. To judge from the refuse deposits, the villages were roughly circular with

* Paper delivered before the Twenty-ninth International Congress of Americanists' Meeting in New York, September 10, 1949.

[1] The work was made possible through a grant from The Viking Fund, Inc. of New York and a William Bayard Cutting Traveling Fellowship of Columbia University and was undertaken under the auspices of the Department of Anthropology of Columbia University and in cooperation with the Museu Nacional of Rio de Janeiro, the Museu Paraense Emilio Goeldi of Belem, and the Museu Territorial of the Territory of Amapá, Brazil.

FIG. 1. The mouth of the Amazon, showing the regions surveyed and the archaeological sites excavated.

sherds thickly deposited to 1 m. in depth over areas ranging from 20 to 50 m. in diameter on low natural elevations in the land, rising about 25 cm. above the surrounding plains. Although these rises are never flooded, they are wet in the rainy season and all evidence indicates the use of a house elevated on piles. The Ananatuba Phase is represented by a distinctive plain ware (Ananatuba Plain) with a hard, smooth, sometimes polished, cream to tan surface, moderate amount of ground-sherd temper, gray core, poorly-controlled oxidized firing, round-bottomed bowls with rounded or square rims, and thickened rims on large globular jars. At the type site (J-9: Ananatuba) the plain ware was 98 per cent of the total sherds, with the decorated ware consisting of a simple vertical brushing (Carmo Brushed) and a very distinct and well-executed incised style (Sipó Incised), characterized by zoned crosshatching, undulating lines, complicated jagged and parallel lines on bowl exteriors.

Mixed in increasing frequency in the upper levels of Site J-7: Sipó of the Ananatuba Phase were ceramic styles belonging to the middle part of the Mangueiras Phase. This contemporaneity of the two ceramic traditions for several levels, with Ananatuba gradually giving

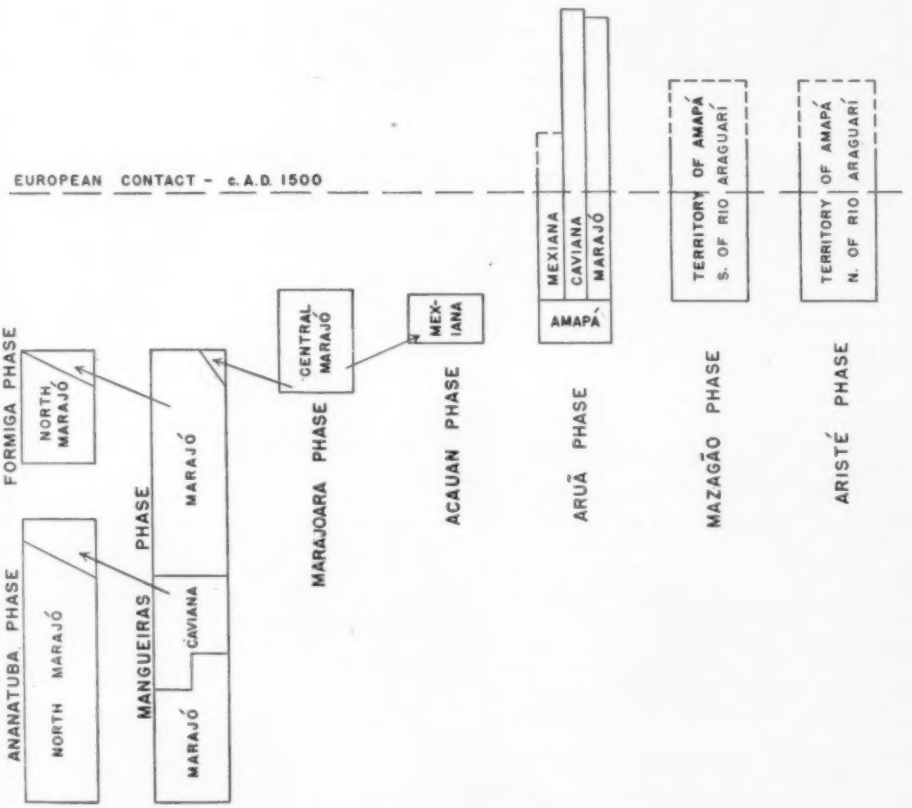

FIG. 2. Sequence of cultural development at the mouth of the Amazon. Each block represents a separate cultural phase. The arrows indicate the influence of one cultural phase upon another. The dotted lines of several blocks indicate that the exact terminal point of these phases in historical times is uncertain. The relative length of the phases is based upon the total depth of the seriated deposits.

way to Mangueiras rather than a clear break and superposition, argues for conquest and amalgamation rather than abandonment and reoccupation of the site. It appears that the Mangueiras culture received a sudden impetus leading to a great expansion. The peoples of this phase swept into north and central Marajó and conquered the peoples of the Ananatuba Phase. The ceramic traditions, and probably non-material items of the Ananatuba culture, were replaced by those of the stronger and more dominant group, the Mangueiras Phase people.

Mangueiras Phase. Stratigraphic evidence on southern Caviana and at a site on Rio Croarí Marajó, west of the general region of the Ananatuba Phase occupation, indicates these areas to be the home of the group before they expanded and took control of the north and central part of Marajó. Data on the Mangueiras Phase are derived from one village site on Caviana (C-3), four habitation sites (J-5, J-6, J-7, J-13) on north Marajó, and one (J-16) in the center of the island near the headwaters of the Rio Anajás. As in the previously described phase, the village sites are located in the forest on low natural rises near small water courses. The pile-supported houses were arranged in a circular or oval pattern covering an area from 25 to 75 m. in diameter. The deposits range from 25 to 85 cm. in depth.

Decorated ware is more abundant here than in the Ananatuba Phase, averaging about 15 per cent of the total count. It includes crude vertical brushing (Bacurí Brushed), simple incising, scraping (Pocoató Scraped), and a limited use of red paint primarily on rims. Except for Pocoató Scraped, which increases in popularity from the lower to the upper levels, the decorated styles remain relatively stable. However, a diagnostic change is visible in the two plain wares. Mangueiras Plain is an incompletely-oxidized ceramic with rough to slick surfaces varying in color from salmon-pink to tan or gray, coarse sherd temper, and a gray core. A multitude of undifferentiated rim shapes and body forms, varying from large jars with everted rims to platters and small bowls with beveled rims, is characteristic of this ware, which accounts for 70 to 90 per cent of the total sherds per level in the lower strata levels. Anjos Plain, an oxidized-fired ware with bright orange surfaces and core; smooth, irregular, soft surface; sherd temper; round and slightly thickened rims; and body forms ranging from large, globular jars to bowls of varying sizes, is associated with Mangueiras Plain throughout the strata cuts. In the lower levels it constitutes 4 to 10 per cent of the sherds and in the upper levels it increases to 70 per cent with Mangueiras decreasing to 26 per cent. This same gradual displacement of a strong, well-made ceramic by a cruder, over-fired, weaker ware also occurs in the Marajoara Phase and in both instances argues for a degeneration in the culture under the island environment.

Fŏrmiga Phase. A third occupation, the Formiga Phase, may be the expansion into this part of Marajó of a tribe from the eastern part of the island. It appears fully developed at Site J-6: Formiga, but has a very short independent existence here before receiving Mangueiras influence. The Mangueiras culture did not dominate the Formiga as it previously did the Ananatuba, however, and instead fades away while the Formiga wares continue strong.

The Formiga Phase is represented by two sites on the north-central coast of Marajó which, by location and village pattern as well as by ceramic tradition, indicate the introduction of a people with a slightly different culture. The sites (J-4 and J-6) are found in the plains instead of in the forest and consist of three to six low mounds. The smallest mound was 5 by 30 m. in extent and 1 m. high and the largest 20 by 100 m. and the same height. The accumulated refuse varied in depth from 15 to 90 cm. The six mounds of the village site at Site J-4: Mucaja were arranged over an area 150 by 350 m.

Formiga Polished Plain, a highly-polished,

EXPLANATION OF FIG. 3. The following phases and types are illustrated:

Aristé phase: *a*, Flexal Scraped. *b*, Serra Painted; vessel is 43.5 cm. high.
Mazagão phase: *c*, *d*, *e*, Uxy Incised. *f*, *g*, Anauerapucú Incised. *h*, *i*, Piçacá Incised.
Aruã phase: *j*, *k*, Piratuba Plain; punctate and ring impressed varieties.
Acuan phase: *l*, Vergal Incised. *m*, *n*, *o*, *p*, Floripes Corrugated.
Ananatuba phase: *q*, *r*, *s*, Sipó Incised.

FIG. 3. Some selected decorated wares from the mouth of the Amazon. (See facing page for explanation.)

reddish to cream-tan ware with poorly-controlled oxidized firing; tan to orange core; sherd temper; small, thin-walled, round-bottomed jars with short, vertical necks; and bowls with rounded or slightly thickened rims accounts for 95 per cent of the total sherds in the lowest levels, decreasing to 11 per cent in the upper levels and completely disappearing in the top-level deposits. This decrease is explained by the expansion, from 17 per cent in the lower to 70 per cent in the upper levels, of Embauba Plain, an unpolished variety of Formiga Polished Plain. The decorated wares are restricted to a few Bacurí Brushed sherds, some simple incising (Formiga Incised), and the 2 per cent occurrence of a poorly-made corrugated ware (Unclassified Corrugated). Except in the two lowest levels in one mound, Formiga Polished Plain and Embauba Plain occur intermixed with Anjos Plain in amounts decreasing from 25 per cent in the lowest levels to 4 per cent in the upper levels.

Marajoara Phase. The upper levels of the strata cuts at Site J-6: Formiga, the principal site of the Formiga Phase, produced a few sherds of the incised and excised[2] types characteristic of the Marajoara Phase. The sudden appearance of this ware toward the end of the occupation of a site that seriates above the Ananatuba and Mangueiras Phases and the absence of any such association in the latter, earlier phases establishes the group as a late intrusion into the area.

A detailed study was made of the Camutins group of 21 mounds (J-15) located within a distance of 10 km. along the banks of the Igarapé Os Camutins, a branch of the upper Rio Anajás. One large cemetery mound, 255 m. long, 30 m. wide, and 10 m. high, is along the central part of the stream with eighteen village mounds upstream from it, one opposite it, and two downstream. With three exceptions, they were all on the east side of the river and were separated by distances of from 8 m. to 3 km. The smallest habitation site, not appreciably eroded, was 8 m. wide and 25 m. long and rose 1 to 1.50 m. above high water level; the largest measured 250 m. long, 70 m. wide, and 6.40 m. high. Strata cuts indicate that the mounds were built from 1 to 3 m. above high-water level and then inhabited, with the houses having a dirt floor. Periodically, the dirt floor was renewed with a fresh layer of clay giving a variegated cross section to the strata, in which fire-burnt floor levels containing ash and sherds alternate with 5 to 15 cm. of sterile clay. The deepest refuse deposit was 2.15 m. in a habitation mound 6.25 m. high.

The most common vessel shape from the village sites is a bowl with curving walls and a flat or slightly round bottom, a smoothed or slipped interior with many crackle marks, rough finger-scraped exterior, rounded lip, an average mouth diameter of 30 cm., and a base diameter of 12 cm. While this form remains stable and standardized, the plain ware of which it is made changes from a hard, light-orange or grayish ware with a gray core and coarse sherd temper (Inajá Plain) in the lowest levels to a crumbly, rotten, over-fired, oxidized, orange ware with coarse sherd temper (Camutins Plain) in the uppermost levels. The former (Inajá Plain) drops from 80 per cent in the lowest levels to 10 per cent in the upper levels while the latter type (Camutins Plain) shows an increase from 6 to 85 per cent. The plain wares comprise 92 to 98 per cent of the total sherds found at all levels in all strata cuts in the village sites. Although decorated wares are scarce, all styles are represented and no time distinction could be discerned between the elaborate decorative techniques of incising, painting, excising (champlevé), double-slipping, scraping, adorning, and retouching. Tanga fragments of both red-slipped and painted styles are found throughout all refuse layers, with the red-slipped variety more abundant.

Strata cuts were excavated in the cemetery mounds of Monte Carmelo and Os Camutins, and it was determined that they were artificially constructed solely for cemetery use. The number of broken pots and sherd fragments associated with the burial urns indicates that burial was made over and over again with no effort to avoid the disturbance of previous burials except by the occasional addition of new dirt. Large fires must have been built upon the mounds, for layers and pockets of burnt-orange sandy-clay were encountered in the cuts. The data from Strata Cut 1 in Site J-14: Monte Carmelo, Mound 1, Guajará, shows a change in burial pattern during the time that

[2] Since "champlevé" refers to the production of a design by cutting away 50 per cent or more of the background, the less rigid term "excised" has been substituted to permit the inclusion of all sherds having any parts of the design cut out.

the cemetery was in use. In the earlier period, polychrome anthropomorphic jars or plain ware jars 75 cm. or more in height, covered with basin-like bowls either inverted over the mouth of the jar or fitted upright inside the neck, were characteristic. These urns contained secondary human burials with the bones painted red and in one urn animal bones, also painted red, were found. Every jar contained a tanga. In two cases, bone fragments associated with tangas were encountered outside the burial urns. The second pattern, observed in the upper levels of the cemeteries, was one of cremation with the ashes buried in a plain or painted jar generally about 30 cm. in height and covered with a lid fitting over the jar rim instead of inside it. No jar with cremated remains contained a tanga. The abundance of sherds from decorated and plain ware bowls indicates that offerings were made to the dead. This burial stratigraphy corroborates the evidence from the village sites that the exised, incised, and painted wares are contemporary.

The complex of traits characteristic of the Marajoara Phase is more advanced and distinctive than that typical of the preceding phases. The most diagnostic features include the use of artificial mounds for habitation and burial, the construction of which depends upon a structured society; standardized ceramics with a variety of well-executed decorative techniques, also indicative of occupational specialization; secondary burial and tangas inside burial urns, with the occasional addition of animal bones and of small, plain, and decorated bowls probably containing offerings; houses built upon dirt floors rather than on piles; and several unique ceramic objects such as stools, tangas, and oval, dipper-like pipe-bowls. In contrast to the earlier and late cultures in the region, which were primarily coastal, the Marajoara Phase is restricted to the interior of Marajó in the plains around Lago Ararí.

Archaeological research in South America to date has recovered evidence of this trait complex only on Marajó. Our field work indicates, however, that the Marajoara Phase entered Marajó at the peak of its cultural development, and that its subsequent history on the island was one of decline. A consideration of all the evidence leads to the conclusion that these people originated in an area where they were able to develop the intensive agriculture necessary to maintain a higher degree of cultural advancement than is possible under tropical forest conditions. Forced to abandon this area, they migrated until they arrived at Marajó Island, which they found inhabitated by the small and loosely organized groups of Mangueiras and Formiga Phase peoples. These, they either drove out or subjected, leaving themselves the sole occupants of the island. Either because of an already existing mound-building tradition, or because the low, flooded plains did not permit the use of the house type to which they were accustomed, they constructed artificial mounds. The land, flooded in winter and parched in summer, did not permit the kind of agriculture needed to assure a constant food supply for the maintenance of such a highly developed culture. Fish in abundance and a variety of small game were available, but to secure them required the expenditure of many more man-hours than are needed to produce an equal return from agriculture. With its new subsistence pattern, the Marajoara culture gradually declined and the last remnants either moved away or were absorbed by the Aruã, the only group on the islands at the time of the arrival of the Europeans.

Acauan Phase. One site (M-3: Acauan), 300 m. long, 10 m. wide, and with 35 cm. of refuse, located in the center of Mexiana on a low natural rise along a marsh, yielded a combination of wares that is difficult to explain. The plain ware of the Acauan Phase (Piryzal Plain), similar in some respects to Mangueiras Plain, has a very hard, smoothed surface, tan to dark gray color, poorly controlled oxidized firing, gray to orange core, fine sherd temper, and a variety of thin-walled, flat-bottomed jars and bowls with thickened rims. Thirty-eight per cent of this plain ware is decorated in three distinct techniques: excision, incision, and corrugation. Acauan Excised, 4 to 6 per cent of the total sherds, is identical in motif to the excised ware of the Marajoara Phase but, except for occasional thin red slip, is applied to an unslipped surface. The incised ware breaks into two types: Vergal Incised with deep incisions in slanting rows giving an all-over "V" or zigzag pattern, and Unclassified Incised, including motifs showing central Marajó influence. Floripes Corrugated is versatile and well executed with examples ranging from fine to wide corrugated rows and from almost flat, even scallops to high, narrow

ridges often interspersed or bordered with one or more plain coils. The predominant vessel shape is a flat-bottomed bowl or jar with outslanting sides and a thickened rim. The corrugations cover the exterior walls, beginning just above the base and stopping some distance below the rim.

The enigma is the association of excision in the Marajoara style with 18 to 28 per cent corrugated ware. On the stratigraphic sequence chart the Acauan Phase is placed contemporary with the Marajoara Phase because of the copied excised technique; however, more work, leading to the explanation of the source of the corrugated influence, may alter slightly this chronological position

Aruã Phase. At the time of European contact none of the phases just described were in existence on Marajó, Mexiana, or Caviana. Archive data support our stratigraphic evidence and identify the sites found sprinkled over the islands, often associated with glass trade beads, as belonging to the Aruã, vestiges of which continued until 1793 in Chaves and 1816 in Rebordelo on Caviana.[3] That the Aruã migrated to the islands from the mainland is demonstrated by the discovery of the plain ware, Piratuba Plain, in its earliest form at three sites (A-5, A-8, A-23) in the Territory of Amapá. Pushed out by the Mazagão and Aristé Phase groups, they sought refuge in the islands, which they found either unoccupied or in the hands of the remnants of the Marajoara Phase.

The evidence from 21 Aruã sites, including 8 cemeteries (M-4, M-5, M-6, M-9, C-1, C-4, C-11, C-12) and 13 habitation sites (M-2, M-7, M-8, J-2, J-3, J-11, C-5, C-6, C-7, C-8, C-10, C-13, C-14, C-15) permits the following description of the culture. Small villages averaging 10 to 30 meters in diameter with refuse deposits of 5 to 10 centimeters are shallower than any preceding phase. They are always found in the coastal forest fringe close to a stream, often about a kilometer above its mouth. In the cemeteries, located in the center of the islands, secondary burials, sometimes accompanied by small bowls and glass or nephrite beads were placed in large jars on the surface of the ground. The only ceramic type is Piratuba Plain, a tan to orange ware with coarse sherd temper and a smooth to highly irregular surface. Contrary to the trend found in the wares of other phases, Piratuba Plain is better made in the later than in the earlier sites. Decoration appears on only an average of 1 per cent of the sherds, most commonly in the form of a row of impressed rings around the neck of large burial jars. Crude, flat, thick, platters with ring decoration on the interior rim edge are also diagnostic.

THE TERRITORY OF AMAPÁ (BRAZILIAN GUIANA)

The survey and excavation carried out in the Territory of Amapá show two important things about the coast north of the Amazon: (1) ceramic-making peoples are recent in the region, and (2) except for the Aruã, they did not come from or have any influence on the islands of Marajó, Mexiana, and Caviana. Both phases described below arrived in the area slightly before the Conquest period and continued into historical times.

Aristé Phase. The northern half of the Territory, between the Rio Araguarí-Amaparí and the Rio Oyapoque, was occupied by the Aristé Phase. Data were recorded from 7 habitation sites (A-7, A-9, A-12, A-13, A-16, A-18, A-21) and 7 cemeteries (A-10, A-11, A-14, A-15, A-19, A-20, A-22). The Cunaní burials reported on by Goeldi in 1895[4] also belong to this phase. The habitation sites, ranging from 30 to 100 m. in diameter are usually on low, wooded hills along streams or lakes. The refuse deposit is only 5 to 10 cm. in depth. Natural rock shelters, caves, or artificially constructed subterranean chambers were used for burial. Although some burial urns contained secondary burials, cremation was more common. Portuguese trade beads were found at two sites.

Two plain wares are present: Aristé Plain, a gritty ware because of its quartz temper; and Serra Plain, a smooth, soft ware with sherd temper. The percentage of Serra Plain increases slightly with a corresponding decrease in the percentage of Aristé Plain in post European times. The predominant decorative technique found on both plain wares is painting in monochrome or polychrome geometrical designs (spirals, dots, interlocking units) and horizontal bands.

Mazagão Phase. Similarities between the ceramics of the Aristé Phase in the north and

[3] Nimuendajú, 1948, pp. 195–7.

[4] Goeldi, 1900.

the Mazagão Phase to the south indicate a possible common origin, but their development in the Territory of Amapá was independent. Although contemporary, they appear to have had no appreciable contact across the Araguarí-Amaparí frontier.

Five habitation sites (A-1, A-2, A-5, A-6, A-17) and 3 cemeteries (A-3, A-4, and Igarapé do Lago) belong to the Mazagão Phase. As in the northern group, the villages are located in forest on high banks along streams. The sites were 10 to 110 m. in diameter with 5 to 30 cm. accumulation of refuse. Cemeteries were on similar high places with the urns, containing secondary burials and occasional miniature bowls and European trade beads, buried just below the surface and usually covered with lids.

Two plain wares occur: Mazagão Plain, a sandy ware, tempered with sand, quartz hunks, and sometimes mica and siliceous fibers, and fired bright red or brown; and Vilanova Plain, a smooth ware tempered with burnt ash of *cariapé*, incompletely fired in an oxidizing atmosphere producing a slight tan to grayish surface. The pre-European sites of this phase have a high percentage of Mazagão Plain and a decorated style (Uxy Incised) typified by sharp, deep, unevenly-made incisions forming rectilinear and curvilinear patterns on bowl exteriors. Some of the larger plain ware jars of this period have appliqué modeling around the neck or on the collar of the jar. About the time of European contact there was a marked increase in the use of Vilanova Plain and the introduction of a completely new style of incision, Anauerapucú Incised. Parallel lines, triangles, rectilinear spirals incised with great precision and regularity and filled with white chalk, are arranged in a limited number of standardized combinations in a manner showing definite affiliations with the Upper Ronquin and Arauquin material from the Middle Orinoco of Venezuela.[5] These same sites produced anthropomorphic burial urns of the Maracá style, modeled in the local plain ware, indicating contact with the Rio Maracá peoples.

CONCLUSION

Since this expedition was the first to conduct stratigraphic archaeological investigations in the Amazon drainage, we are at a decided handicap in making comparative studies and in relating our data to other work in South America. As many problems were raised as were settled. The cultural development that we were able to work out from stratigraphic sequence is only a beginning. Similar research must be done in many other parts of the Amazon before we can form an outline of the culture history in the tropical forest regions of South America.

[5] Kidder, 1948, Pl. 73; Petrullo, 1939, Pls. 31, 32.

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Charlottesville, Va.
November, 1949

ARCHAEOLOGY OF COTUA ISLAND, AMAZONAS TERRITORY, VENEZUELA

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COTUA Island is situated among the Yavariven Rapids of the Orinoco River northwest of the island of María Auxiliadora in Latitude 5°35′N and Longitude 67°35′W (Fig. 4). It measures some 2000 meters long and 500 meters wide.

About four years ago, when the waters of the Orinoco were unusually high, they completely covered the island. Nevertheless, a Creole is now living there, as the fertility of the soil is great enough to overcome his fear that the river will again rise over the island. Directly west of his house, the water has eroded pebbles and Indian potsherds from the ground (Fig. 4, *4*). To the southeast, on María Auxiliadora Island, there are petroglyphs (Fig. 4, *1*), and in addition both islands bear workshops, where the Indians appear to have ground stone artifacts on outcrops of rock (Fig. 4, *2*, *3*, *5*).

During a visit to Cotua Island in 1948, we collected artifacts from both the pottery deposit and the workshops. The following is an account of the circumstances and nature of our finds.

POTTERY DEPOSIT

The base of Cotua Island consists of a granite outcrop, and it was on an eroded section of this rock that sherds and other artifacts were most numerous (cf. Fig. 5, *upper right* and *lower left*). All had been much broken by the stream.

POTSHERDS

Rims

The rims can be divided into 37 types, which are illustrated in Figure 6. In the following description, the letters refer both to the types and to the drawings in Figure 6.

Type a: simple, somewhat thickened rim from a medium sized vessel for holding liquids. Four examples.

Type b: simple, slightly thickened rim. The curvatures suggest a shallow, open bowl of medium size. Eight examples.

Type c: straight, flat rim, which is moderately polished only on one side. This appears to be from a straight- rather than a curving-sided vessel. Twelve examples, one of which has a conical hole, as shown in the illustration.

Type d: flat rim, slightly indented beneath the lip; from a medium-sized vessel for holding liquids. One example.

Type e: simple, thickened rim from a large vessel for holding liquids. Ten examples.

Type f: simple rim from a medium-sized open bowl. Six examples.

Type g: simple rim from a plate, very open bowl, or possibly a lid. Its curvature indicates a diameter of approximately 31 cms. Eight examples.

Type h: rim of a shallow, open bowl some 30 cm. in diameter. Three examples.

Type i: rim of a shallow (?), open bowl about 40 cm. in diameter. One example.

Type j: simple, thickened rim, possibly from a plate. Two examples.

Type k: simple rim, from a constricted bowl of medium size. One example.

Type l: neck and rim with part of a vertical, flat loop handle attached. One example.

Type m: rim of an open bowl, decorated on the lip with modeled projections. One example.

Type n: flat, expanded rim from an open bowl or platter, measuring some 18 cm. in diameter, with an incised line near the edge of the lip. One example.

Type o: flat, expanded rim from an open bowl or platter. Three examples.

Type p: flanged rim from an open bowl about 30 cm. in diameter. Two examples, one having incised decoration.

Type q: flanged rim from an open bowl some 30 cm. in diameter. Three examples.

Type r: flanged rim from an open bowl about 30 cm. in diameter. Incised decoration similar to Type *p*. One example.

Type s: flanged rim from an open bowl. The thickness is irregular because of the presence of ornamented appendages and incision. Three examples.

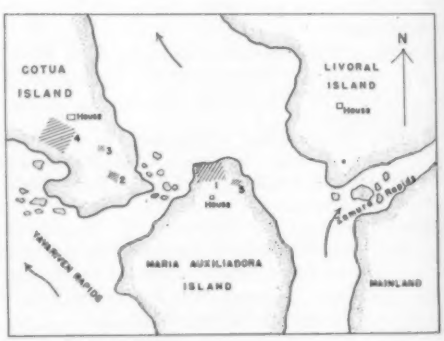

FIG. 4. The Orinoco River in the vicinity of the rapids of Yavariven, Venezuela. *1*, petroglyphs. *2*, *3*, *5*, stone workshops. *4*, ceramic deposit.

* Translated by Irving Rouse.

Type t: simple rim from an open bowl or olla, with incised decoration. One example.

Type u: rim of an open bowl, decorated with an incised and modeled appendage on its outer edge. Three examples, one with an incised line on the lip, as illustrated.

Type v: rim of an open bowl or platter decorated with modeled projections on the lip, each of which is incised. One example.

Type w: simple flaring rim. One example.

Type x: rim of an open bowl, decorated with incised ornamentation and a lug, which is punctated on its outer surface. One example.

Type y: flat rim from an open bowl. Three examples.

Type z: thickened rim from a constricted, medium-sized bowl for holding liquids. Two examples.

Type a′: thickened rim from a discoidal platter, possibly a griddle. Four examples.

Type b′: flanged rim from an open bowl or platter, having incision on the flange. One example.

Type c′: flanged rim from an open bowl, decorated on the flange with a pair of parallel, incised lines. Two examples.

Type d′: rim sherd from the neck of a bottle or constricted bowl. One example.

Type e′: simple, thickened rim from a constricted bowl for holding liquids. Nine examples.

Type f′: flanged rim from an open bowl, with two angular, parallel lines incised on the rim. One example.

Type g′: simple rim from a constricted bowl decorated with a zigzag incised design. One example.

Type h′: simple rim from a shallow, open bowl. One example.

Type i′: thickened, ring-like rim. One example.

Type j′: thickened rim from a medium-sized open bowl, with a lug attached to the lip.

Type k′: rim from a discoidal platter, enough of which is present to indicate that there was little curvature around the edge. One example.

Type l′: thickened rim from an open bowl, decorated on the inside with incised parallel lines. One example.

Bases

There are four types of vessel bases (Fig. 7, *A*, *a-d*). Type *a* has two peculiarities: its horizontal curvature is not what one would expect in the case of a round vessel, and it is polished on the inner rather than the outer surface. We have made a hypothetical reconstruction of the

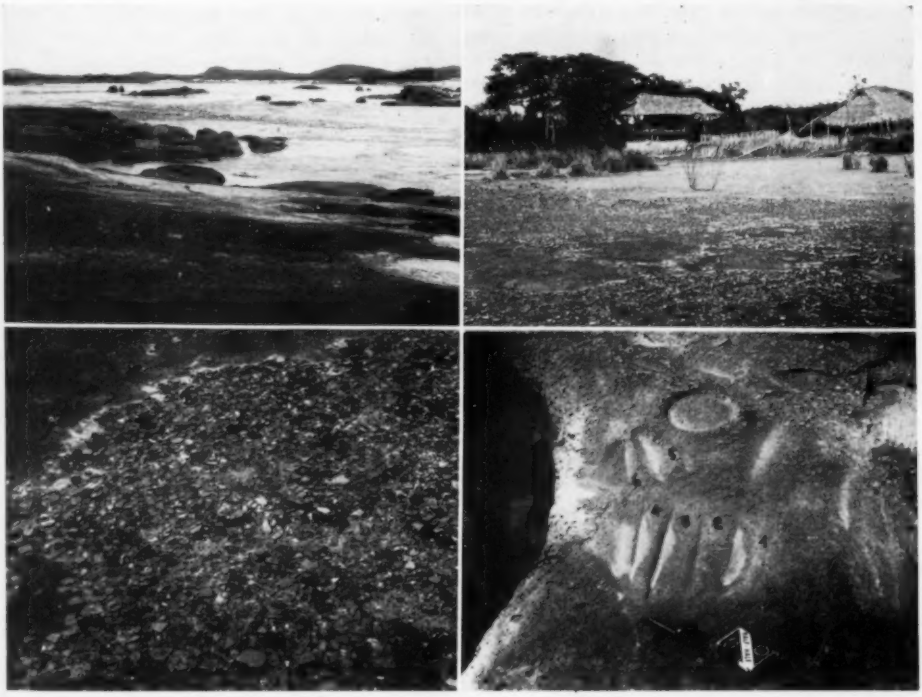

FIG. 5. Cotua Island, Venezuela. *Upper left*, rapids of Yavariven, seen from the island. *Upper right*, huts on the island, with the sherd deposit in the foreground. *Lower left*, the sherds, mixed with sand and loam and lying on a granitic outcrop. *Lower right*, Workshop 700.

original form of this base (Fig. 7, *A*, *a*), which leads us to believe that it is from an oval or rectangular vessel with a flange attached obliquely to the rim only a short distance above the base. The type is represented by two specimens.

We have only a single example of Type *b*, a tall annular base; eleven of Type *c*, a short annular base; and one of Type *d*, a flat base.

Handles

The four fragmentary handles are of two types (Fig. 7, B, *a*, *b*). Type *a* consists of a broad, vertical strap handle with relatively little curvature, so that it is far from being semiannular when viewed from the side. Its top was attached to the lip of the vessel. There are two examples, one 98 mm. wide and the other 97. The one illustrated has a conical lug in the center of the top of the loop; the other is plain.

Type *b* is also a vertical strap handle but narrower and with a thicker, more ovoid cross section. Like *a*, this type has the form of a flattened loop. There are two examples, one measuring 68 mm. in width and the other 67. Both are too fragmentary to determine their position on the vessel.

Decoration

Incision. Figure 7, *C* illustrates the incised designs to be found on body sherds; incision on rim sherds is illustrated in Figure 6, *p*, *r–x*, *b′*, *c′*, *f′*, *g′*, *l′*. The designs may be divided into two groups, one with narrow lines (1 mm.) and the other with broad lines (2 mm.). All appear to be geometric.

Painting. Some sherds have traces of a uniform red or white slip, or are red on one surface and white on the other. Two white-slipped specimens have been rubbed with a hard object before or after firing so that the reddish clay shows through the white paint in the form of stripes.

Modeling. The pottery has been so broken by the action of the river that only a few examples of lugs and other appendages have survived. We obtained the following, which are illustrated in Figure 7, *D*:

a) An appendage rising above the rim of an open bowl and decorated with incision.

b) A mammiform lug, which may have been a false handle.

c) A lug similar to *b*, which has three small mammelary projections on its end.

d) A curved sherd, possibly from the body of the vessel, which bears three somewhat flattened lugs, each with a conical punctation in its center.

e) Another mammiform lug, similar to *b*, but smaller in size. Like the latter, it is hollow.

f) A mammiform lug applied to the body of a vessel.

g) An interesting fragment which, if it was part of an anthropomorphic lug, may have been the lower half of a thick-lipped mouth such as those found at Los Barrancos on the lower Orinoco,[1] and Río Chico, El Palito, and San Javier along the north coast of Venezuela.[2]

OTHER ARTIFACTS

Discs

We obtained two discs or counters of clay, which we have been careful not to confuse with potsherds that may have acquired a discoidal shape through rolling (Fig. 7, *E*). It is apparent that these specimens were manufactured as discs. They have a thickness of 8 mm. and a diameter of 80 and 102 mm. respectively.

Polishers

Two stone polishers were found. These are composed of the local granitic rock and show only traces of use. They may possibly have served in the manufacture of pottery.

Stamps

The site yielded two fragments of clay stamps (Fig. 7, *F*, *a*, *b*). Specimen *a* is from a cylindrical, ocher-colored specimen with a central perforation. It is decorated with linear and triangular motives. Specimen *b* is also cylindrical, but greyish in color. It may possibly have had an interior perforation. The design consists of concentric triangles.

We also obtained one complete stamp of bone (Fig. 7, *F*, *c*). This is triangular in shape and decorated with concentric circles and triangles.

Whorls

There are two spindle whorls of clay, circular in shape, with a conical perforation in the center of each. Their maximum diameters are 102 and 104 mm. and their thicknesses 5 and 7 mm. respectively.

Beads

Several stone beads were collected. These had a discoidal shape.

[1] Cornelius Osgood and George D. Howard, "An Archeological Survey of Venezuela," *Yale University Publications in Anthropology*, No. 27, New Haven, 1943, Fig. 22.

[2] Material in the Museo de Ciencias Naturales, Caracas, Venezuela.

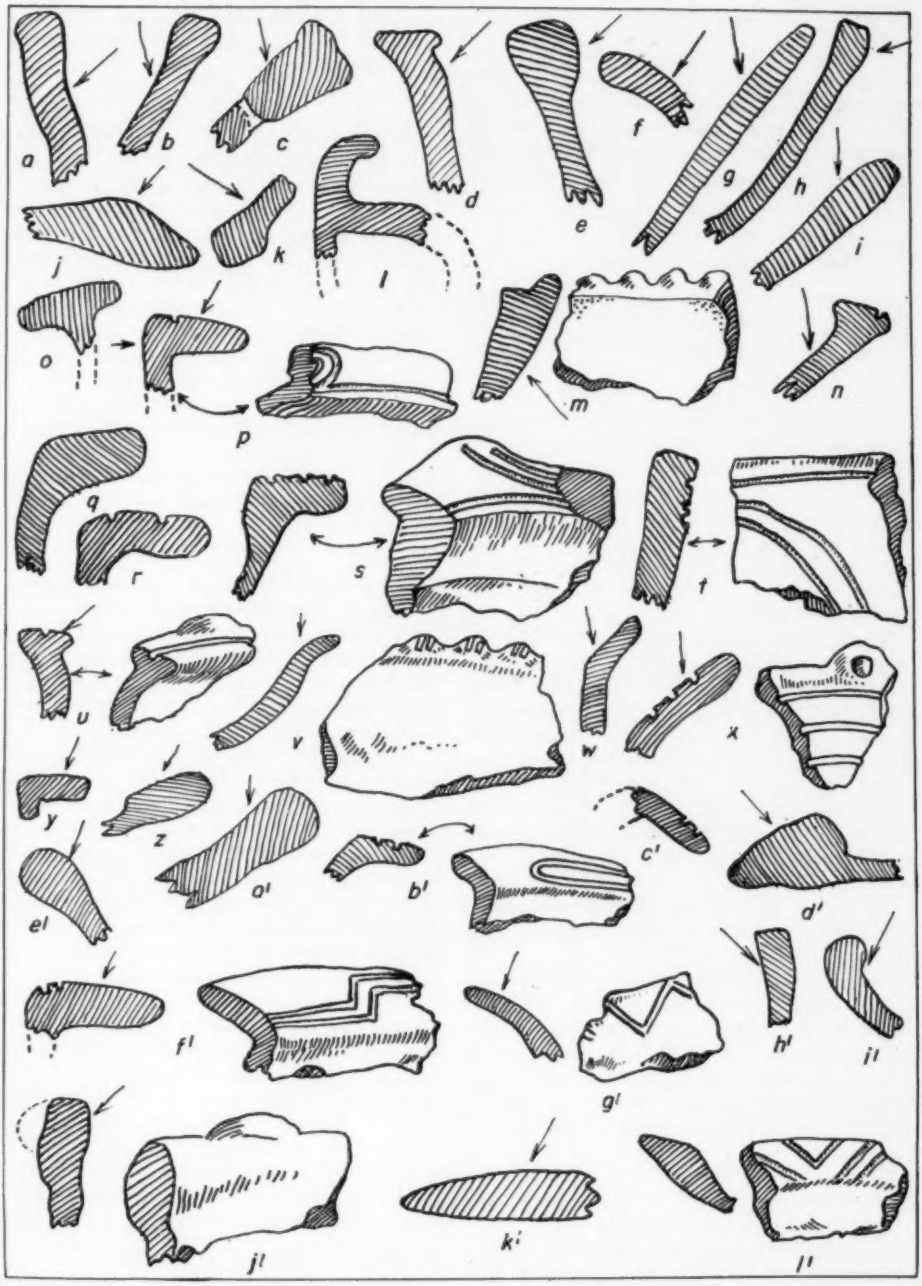

FIG. 6. Types of rim sherds from Cotua Island, Venezuela.

Miscellaneous

Two modern, Spanish potsherds were found, one glazed on the interior and the other with red-painted decoration. Since the material has been eroded from the ground and is not in stratigraphic position, we cannot attach any chronological significance to the presence of these sherds.

WORKSHOPS

NATURE OF THE SITES

The workshops were situated near the house (Fig. 4, *2*, *3*). It was here that the Indians made stone beads and possibly other artifacts of the same material.

Workshop 700. The most important of the workshops may be seen in Figure 5, *lower right*. It is composed of seven half-lenticular basins and a circular one. We believe that the former served for the manufacture of stone implements and cylindrical beads. The latter, which is of a type not previously encountered, may have been used in the trimming, grooving, and facial polishing of discoidal beads and other flat-surfaced artifacts.

The abrasive quality of the rock must have been important for the work of grinding. It is possible that fine sand and water were added to increase the efficiency of the process, although we have no evidence of this except for the fact that all the workshops are near water.

The half-lenticular basins illustrated in Figure 5, *lower right* have the following lengths and widths: *1*, 127×33 mm.; *2*, 114×16mm.; *3*, 192×15 mm.; *4*, 112×11 mm.; *5*, 94×24 mm.; and *6*, 83×10 mm. The circular basin (*7*) measures 167 mm. in diameter and 12 mm. in depth.

Workshop 701. This consists of two elongated basins near a depression in the rock filled with water. Both this site and Workshops 702 and 703 appear to be best adapted to the sharpening of stone adzes and axes, in that one wall of each basin is almost vertical whereas the other is sloping. The two basins measure respectively 129×28 mm. and 112×11 mm.

Workshop 702. Here, there is a single elongated basin near a pool of water, measuring 134 mm. in length and 19 mm. in width.

Workshop 703. This also consists of a single elongated basin alongside a pool of water. The length is 129 mm. and its width 23 mm.

Workshop 704. The final basin is of the same type as *7* at Workshop 700, but only a part of the circle remains. We believe that it had similar uses. If it was circular, its measurements were the same.

OBJECTS FOUND

Sandstone pebbles and chips of various sizes and colors were collected at the workshops. These may be classified so as to illustrate stages in the manufacture of discoidal beads: (1) pebbles, as found in their natural state; (2) pebbles from which chips have been struck off; (3) the chips themselves, which in their crude state are more or less leaf-shaped and rough surfaced; (4) chips with the first traces of the battering necessary to make them circular; (5) chips on which the grinding of the two faces and the edge has been begun; (6) beads which have been well rounded and polished on both faces; (7) beads on which a conical perforation has been started from one side; and (8) circular, polished beads with biconical perforations.

CONCLUSIONS

The pottery deposit has considerable interest because it is the southernmost known in Venezuela and is situated on the route of travel between the Orinoco and Amazon rivers. While the collection is small, it permits us to suggest some ideas concerning relationships in material culture of the Indian inhabitants.

In connection with the rim typology, it is important to note a similarity in profile between the projecting flanges with incised designs and comparable specimens from Los Barrancos on the lower Orinoco,[3] although the Cotua flanges are less elaborately and artistically decorated. The two sites also resemble each other in the presence of vertical handles and annular bases, traits which are found, however, in different contexts at other sites.

The incised and modeled decoration is too fragmentary to characterize in any detail. However, it is to be noted that Cotua pottery differs both from that which Howard[4] obtained in the upper levels at Ronquín on the middle Orinoco and from the comparable material collected by Petrullo in Amazonas Territory and by the Evans in Brazilian Guiana,[5] in that it is much less elaborately incised and punctated. Cotua pottery can also be distinguished

[3] Osgood and Howard, *op. cit.*, Fig. 18.

[4] George D. Howard, "Excavations at Ronquín, Venezuela," *Yale University Publications in Anthropology*, No. 28, New Haven, 1943.

[5] See above, p. 9. *Editor.*

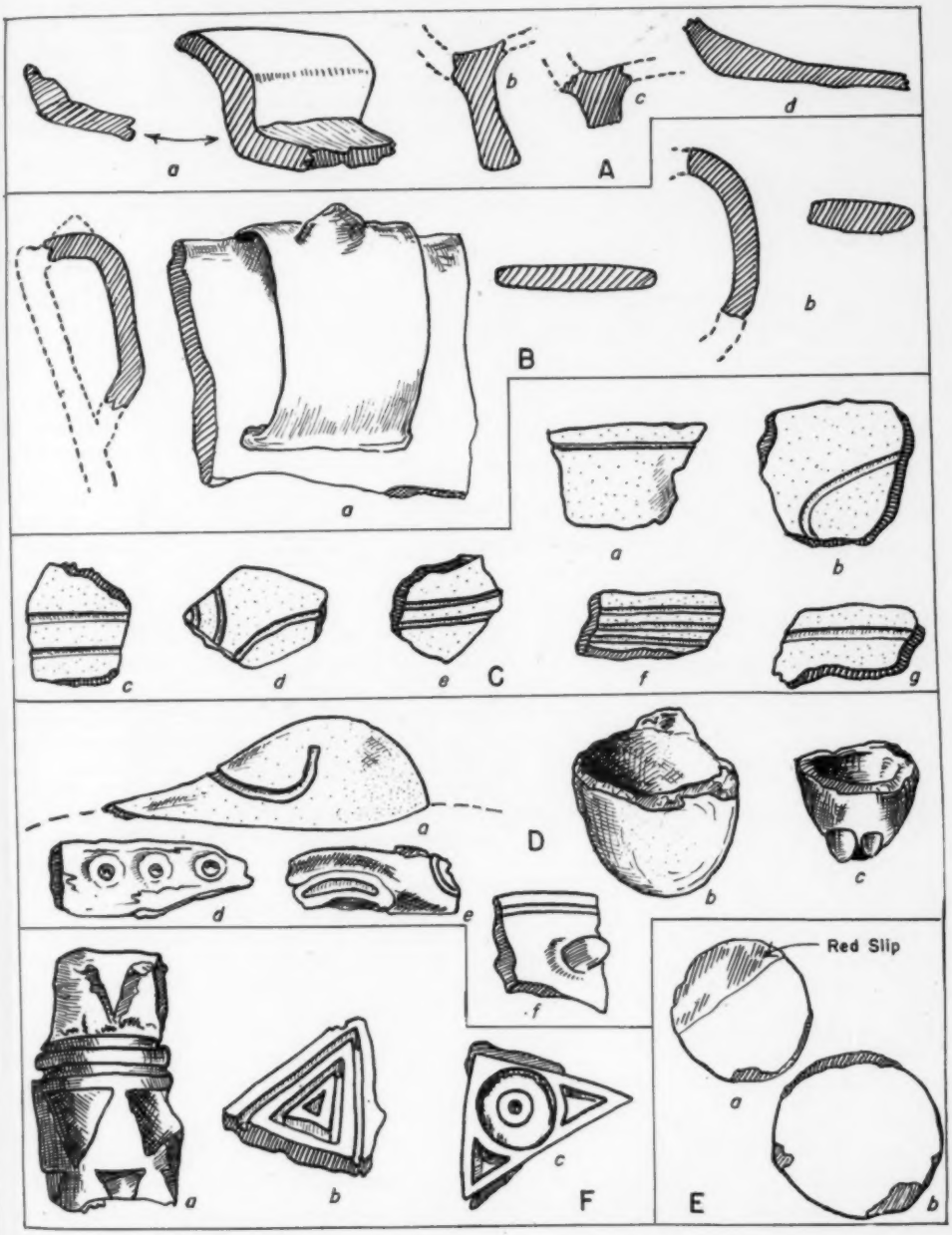

FIG. 7. Pottery from Cotua Island, Venezuela. *A*, bases. *B*, handles. *C*, incised decoration. *D*, modeled decoration. *E*, discs. *F*, stamps.

from the earlier ceramics at Ronquín, with its red and white painted designs.

In view of these distinctions, and because the comparable Los Barrancos pottery appears to be intermediate in age between Early and Late Ronquín,[6] we suggest that Cotua occupied an intermediate chronological position. This is consistent with its location on the route of communication from Ronquín to the comparable Brazilian sites, between which some relation at a later date now seems to be indicated.

[6] Alfred V. Kidder, "The Archeology of Venezuela," in "The Handbook of South American Indians," *Bulletin of the Bureau of American Ethnology*, No. 143, Vol. 4, Washington, 1948, pp. 432–3.

Museo de Ciencias Naturales
Caracas, Venezuela
September, 1949

THE EVOLUTION AND PERSISTENCE OF CERAMIC MOTIFS IN NORTHERN GEORGIA

ROBERT WAUCHOPE

STAMPED or impressed designs on pottery from a group of relatively early sites in northern Georgia provide new data on the origin of several well known motifs of later times, and add to the evidence for a considerable cultural continuity between the archaeological phases of this area.

In a previous article for AMERICAN ANTIQUITY (Vol. XIV, pp. 201–9), I summarized the general ceramic sequence in the Etowah Drainage. Fabric impressed pottery seems to be the first majority ware in this area. It gradually decreased in popularity as Mossy Oak Simple Stamped increased and Deptford Bold and Linear Check Stamped appeared. The last named, together with Deptford Simple Stamped, became majority types during Late Archaic or Early Woodland times. In the meantime Woodstock Stamped and Woodstock Incised pottery appeared, but did not reach their frequency peak until Early Swift Creek had presumably degenerated into its later form near the end of the Middle Woodland period. Napier Stamped appeared at this time. Napier and Woodstock pottery strongly influenced the Early Mississippi "Etowah" wares, both stamped and incised. In the latter part of this period, Savannah Stamped intruded briefly, but the Etowah types persisted and finally deteriorated in carefulness of execution, thus evolving into the Lamar pottery of Late Mississippi time.

In the article mentioned above, I described in some detail the stratigraphy of four sites in Cherokee and Bartow Counties: Long Swamp (1-Ck), Horseshoe Bend (4-Ck), Wilbanks Farm (5-Ck), and Two Run Creek (3-Br). The first three provided abundant pottery for study of the Mississippi periods, and a little underlying material from Middle Woodland. The Bartow County site yielded detailed data on the Late Archaic and first Early Woodland horizons. I have now reviewed the pottery from several sites occupied chiefly during the Woodland periods intermediate between these two extremes and from two later or Late Mississippi sites.[1] Five of the early sites are on the Etowah River in northeast Cherokee County in the general vicinity of Ball Ground. The Conn Creek site (16-Ck) and the Smithwick Creek site (17-Ck) are located at the mouths of these two streams, respectively; the Croker site (19-Ck) lies on the south bank of the Etowah at the base of a deep southward loop two miles downstream from the mouth of Long Swamp Creek; 12-Ck is situated on the river's east bank a few miles north of this creek. The fifth site, 9-Br, is an early village on the summit and slopes of a red clay ridge parallelling the south bank of the Etowah at the base of a deep southward bend near its confluence with the Oostenaula not far from Rome. A sixth early site (1-Dw) is east of these, in Dawson County, on the west bank of Amicalola Creek between Dawsonville and Holcomb.

A preliminary pottery count for three of the early Cherokee County sites yields the frequency percentages shown at the top of the next page.

[1] A second grant from the Tulane University Council on Research has aided this work. The University of Georgia and the State Department of Natural Resources sponsored the W. P. A. archaeological survey which obtained the pottery originally.

	16-Ck	*17-Ck*	
Check stamped	53.6	38.5	30.6
Simple stamped	27.4	48.7	55.4
Woodstock Stamped	12.1	8.5	11.3
Fabric impressed	4.1	3.0	2.7
Early Swift Creek	0.7	1.3	0.0
Napier Stamped	2.1	0.03	0.0
Total number of sherds	718	3715	222

Only a small percentage of the simple stamped sherds were of the fine-line Mossy Oak type:

	16-Ck	*17-Ck*	*19-Ck*
Per cent of simple stamped	8.6	7.6	8.1
Per cent of all sherds	2.4	3.7	4.5

This relative low frequency of Mossy Oak types and of fabric impressed, and the strength of Woodstock Stamped indicate that these three sites were definitely out of the Archaic period and well into the Woodland periods during most of their occupancy. Rare occurrences of Swift Creek and Napier pottery suggest that they lasted at least until Middle Woodland. Only one of the three sites, Smithwick Creek (17-Ck), yielded any Early Mississippi sherds (40 among more than 3,600).

The two late sites are farther northeast, in the Chestatee-Upper Chattahoochee Drainage: one in Hall County (2-Hl) and one in White County (2-Wh), the latter a mound near the north bank of the Chattahoochee about three-quarters of a mile from the mouth of Sautee Creek near the town of Helen.

FILFOT CROSS

Sherd counts show that the filfot cross, known for many years as a typical Lamar Stamped decoration (Fig. 10, *b*), occurs in great frequency in the Etowah Stamped pottery of the previous Early Mississippi period (Fig. 10, *a*). As a matter of fact, the filfot cross enjoys its greatest popularity in the earliest of the Early Mississippi sub-phases (Phase A), where it comprises 17.8 per cent of Etowah Stamped designs at the site of Long Swamp. It never again reaches this frequency in subsequent phases of the Early Mississippi period or the transitional Early-Late Mississippi that follows. The filfot cross won quick favor as soon as it appeared; in this earliest Phase A it is second only to the always overwhelming favorite, the superimposed triangles. In later phases, Long Swamp potters seem to have returned to one of their two original designs, the lined blocks, but the filfot cross held a strong third place in popularity, always outnumbering the other designs (frets, interlocking circles, concentric squares, and others) by from three-to-one up to twelve-to-one. I do not know of any statistics published for the Late Mississippi Lamar period, for which the filfot cross has long been best known.

I have found no sure forerunner of the filfot cross in Woodland times. One is tempted to speculate that it may have grown out of certain Woodstock Stamped motifs; it would have been easy, for example, to discover the filfot cross simply by connecting the ends of sets of lines in the lined blocks design, for the nucleus of each is identical (Fig. 8). Even if this happened, however, potters retained the lined blocks idea throughout Early Mississippi. Unless new evidence is forthcoming, we must consider the filfot cross an Early Mississippi invention.

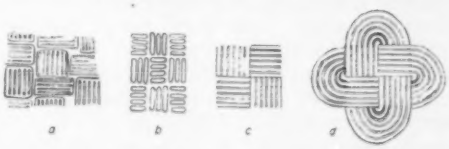

FIG. 8. Possible evolution of the filfot cross: *a*, *b*, Woodstock Stamped (Late Archaic and Early Woodland); *c*, Etowah Stamped (Early Mississippi); *d*, Etowah Stamped (Early Mississippi) and Lamar Stamped (Late Mississippi).

FIGURE-OF-EIGHT, CONCENTRIC CIRCLES, CROSS-IN-CIRCLE

These three typical Lamar motifs (Fig. 10, *f*, *h*, *k*) have earlier occurrences. We find all three in the Savannah Stamped pottery intrusive here near the end of Early Mississippi (Fig. 10, *g*, *j*). At least two, the concentric circles (Fig. 10, *c*) and the cross-in-circle (Fig. 10, *i*), are seen in Swift Creek pottery. Strangely enough, Etowah Stamped has only the concentric circles (Fig. 10, *d*, *e*). The Etowah interlocking circles come nearest to the figure-of-eight, but are quite different. Etowah superimposed triangles or concentric diamonds, crossed by horizontal and vertical lines, are frequently so rounded and flattened as to resemble concentric circles with a cross, but the similarity is only superficial.

Since Etowah Stamped and some associated ceramics occur between Late Swift Creek and the brief intrusion of Savannah Stamped late in the Early Mississippi period, we are not justified in claiming an unbroken continuity in the use of these motifs. In contrast to more intri-

cate designs, the concentric circles, often with a central spot, and the cross-in-circle could have been invented more than once, or the Savannah potters may have learned them directly from Late Swift Creek craftsmen in certain parts of Georgia. It is also quite possible that Savannah Stamped potters picked up either Early or Late Swift Creek sherds and obtained the idea from them.

SUPERIMPOSED TRIANGLES

This is one of the two earliest Etowah Stamped, Early Mississippi designs (Fig. 10, *u*). One can interpret the motif as superimposed triangles, resting on a base line or set of base lines; or if one thinks of the design as concentric diamonds, these "base lines" bisect the diamonds (Fig. 9, *e*). It is really not important which view one takes, for as we shall see later, the origin of this design is in neither diamonds nor triangles. In Early Mississippi times there are many variations of the basic pattern, which, at Long Swamp, comprises 45.9 per cent to 66. 8 per cent of all motifs in Etowah Stamped ware. The design is even more popular at other Early Mississippi sites we excavated, such as Horseshoe Bend. In the earliest of the variations, the triangles are much steeper and tend to arch, the apex forming about a 40-degree angle instead of the more usual 90-degree angle (Figs. 10, *p, q;* 9, *d*). This type comprises over half of all triangle types in the earliest stratum at Long Swamp (mound base), whereas in later layers of the mound, the type represents only 0.7 per cent to 5.2 per cent of the basic design's variations. Closely correlated with the steep arched triangles are short lines connecting the triangles above and below the base lines; these cross the parallel base lines and form a ladder-like base (Figs. 10, *p, q;* 9, *d*).

What is doubtless the prototype of this steep variant occurs at the Conn Creek site (16-Ck), where seven of thirteen superimposed triangles are of this particular type. Moreover, with the exception of the five more normal triangles executed in Napier technique, all eight specimens have the ladder-like base formed by connecting lines as described above.

Further interesting data verify the early and prototypical nature of the Conn Creek specimens, and distinguish them from the later Etowah Stamped ware. Their paste is characteristically early in color, thickness, and surface texture. Early Mississippi wares are made

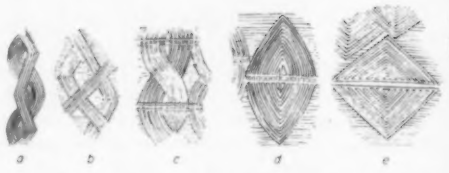

FIG. 9. Suggested evolution of the superimposed triangles: *a*, Early Swift Creek (Late Archaic or Early Woodland); *b*, Napier (Middle Woodland); *c*, Middle Woodland; *d*, Middle Woodland and Early Mississippi; *e*, Etowah Stamped (Early Mississippi).

of a paste that can be gray or black but more frequently is salmon pink, red brown, or brown; thickness ranges from 5.5 to 13.0 mm., but most specimens are between 6.5 and 7.5 mm. Surface color is tan or brown in 70 per cent of all specimens, 30 per cent are gray, and less than 1 per cent black. In contrast to these, the Conn Creek sherds with steep, arched, and connected triangles are black or very dark gray in paste color (92 per cent of specimens); they range from 4 to 8 mm. in thickness, with an average of 5.4 mm. and a mode at 5 mm., and over 92 per cent have a definitely gray-brown tone in the surface color. These colors and thicknesses are typical of most of the early plain, check stamped, and simple stamped wares of northern Georgia.

It is quite clear that we have at Conn Creek a ware that is typically early in paste, thickness, and surface color, and decorated with the direct forerunner of the most characteristic Early Mississippi motif.

The one remaining non-Napier superimposed triangle at this site is rounded and slightly flattened, rather than straight-lined with sharp angles. This variant also appears in Etowah Stamped, but at Long Swamp not until the close of Early Mississippi times. The Conn Creek specimen has the ladder-like base of apparently early origin, and its paste color, thickness, and surface color are again of the Woodland period types.

Turning now to the five remaining superimposed triangles, we find that they are all executed in the Napier technique of very thin, closely spaced lines. The lines are straighter and the angle at the apex sharper and more open, as in Mississippi times, although a few tend to arch more than was normal after Late Woodland. Two of the five sherds are 5 mm. thick, two are only 6 mm. thick; they are thus

considerably thinner than the Mississippi period average and are very close to the Woodland period average. All five have black or very dark gray paste, an early characteristic. As in later specimens, these Napier triangles have more than the average number of base lines.

While my suggestion regarding the possible evolution of the filfot cross motif from Woodstock designs can scarcely be considered more than speculation, I believe we have a much stronger case for a true evolutionary sequence of design stages leading to the superimposed triangles. This sequence, presented somewhat diagramatically in Figure 9, is actually more convincing when one is working with the specimens themselves, some of which are reproduced in Fig. 10, *l–q*, *u*. Back in Early Swift Creek pottery, a favorite motif consists of intertwining sets of parallel lines, either curvilinear or combined curvilinear-rectilinear (Figs. 9, *a;* 10, *l*, *m*). A similar design, complicated by the introduction of a third set of lines, is also popular in the later Napier Stamped ware. By late Middle Woodland, this early motif has developed into the form shown in Figures 9, *c* and 10, *o;* the number of lines in each set has increased from three or sometimes four to six or more, and a pair of straight horizontal parallel lines has been introduced across the intertwining strands at the level of their greatest lateral spread. The close similarity between this stage and the succeeding late Middle

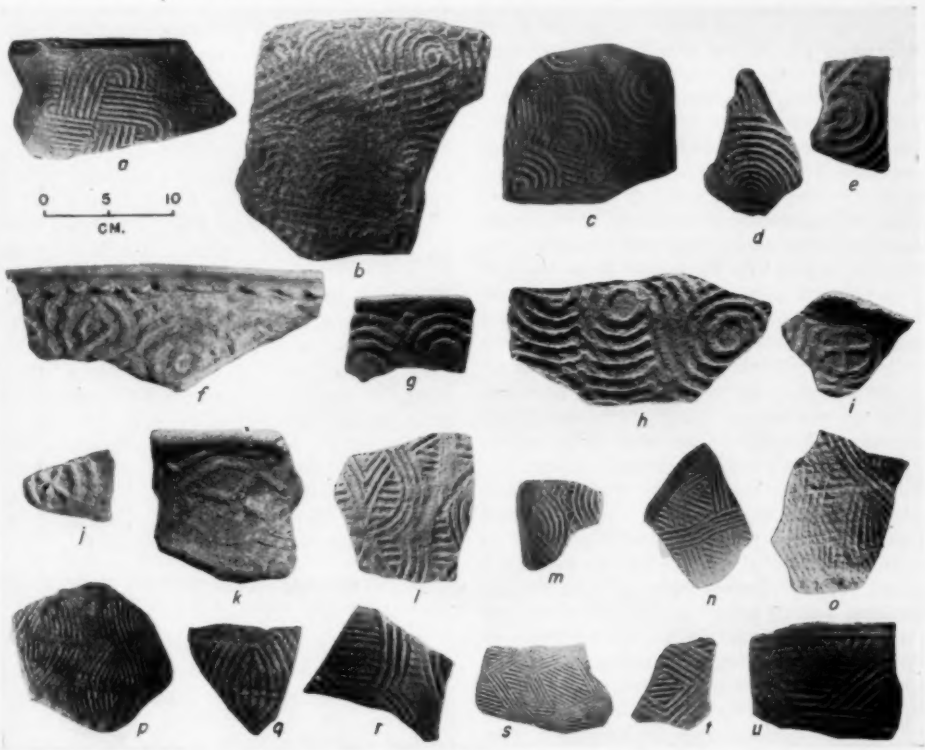

FIG. 10. North Georgia ceramic motifs: *a–b*, filfot cross (*a*, Etowah Stamped, Early Mississippi; *b*, Lamar, Late Mississippi; *c–f*, concentric circles (*c*, Early Swift Creek, Early Woodland; *d*, *e*, Etowah, Early Mississippi; *f*, Lamar, Late Mississippi); *g–h*, central spot (*g*, Savannah Stamped, Early Mississippi; *h*, Lamar, Late Mississippi); *i–k*, cross-in-circle (*i*, Late Swift Creek, Middle Woodland; *j*, Savannah, Early Mississippi; *k*, Lamar, Late Mississippi); *l–q*, suggested evolution of superimposed triangles (*l*, *m*, Early Swift Creek, Early Woodland; *n*, Napier, Middle Woodland; *o*, Middle Woodland; *p*, *q*, Middle Woodland and early Mississippi); *r*, Woodstock linked ovals, Early and Middle Woodland; *s*, Middle Woodland; *t*, Etowah, Early Mississippi; *u*, Etowah, Early Mississippi.

Woodland and first Early Mississippi variation (steep superimposed arches) is obvious in Figure 10, *o–q*. Instead of permitting one set of lines to cross the opposite set and continue to the next design unit, the artist now brings the two sets together and completes the unit. Especially significant is the fact that the next unit above or below is still in the same position it held previously, so that the over-all effect is almost identical. Indeed, the reader will see that it is difficult to distinguish between Figure 10, *o* and *p*. For an excellent example of this same stage in the evolution of superimposed triangles, see the lower right specimen in Plate 51 of Lewis and Kneberg's *Hiwasee Island*.[2]

In later specimens the steep arched "triangles" become more distinct as independent units (Fig. 10, *q*), and finally, in the full Early Mississippi period, the lines have straightened out and the arches become true triangles(Fig. 10, *u*). The paired horizontal lines crossing the earlier designs are now frequently increased to three or even four in number, or reduced to one single line; two are still characteristic, however. In many cases, not illustrated here, a second single line or set of lines may bisect the triangles vertically. The short lines which connect the triangles above the horizontal base lines to those below it may or may not (Fig. 10, *u*) remain. The variations on this basic design are numerous; I shall describe them in detail in a forthcoming publication.

Last summer, while photographing representative samples from our large northeast Georgia collections, I noticed that the steep arched "triangles," with connecting lines crossing the double base line, are standard at several sites. Contrary to usual procedure, I photographed these collections prior to recording them, in order to dispose of some very old film, so I cannot yet say whether these sites were occupied only a short period at the particular time when this stage of the design was standard, or whether we may recognize a regional variation in mode or even the possible center of its dispersal. These northeast specimens are all executed in a very fine, thin-line technique reminiscent of the Napier, and it is indeed at this very point in northwest Georgia chronology (late Middle Woodland) that both Napier and arched triangles are most abundant. Incidentally, northeast Georgia sites yield Early Swift Creek pottery in much greater abundance than do the early sites we sampled in northwest Georgia. This can scarcely be due to chance sampling, for we have collections, both surface and excavated, from literally hundreds of northwest Georgia sites. The fact must be of ethnic importance, and I hope that our further studies of the northeast ceramic chronology may show what happened to the followers of Swift Creek tradition during the period when they left only scanty traces of their pottery in the northwest.

[2] T. M. N. Lewis and Madeline Kneberg, *Hiwasee Island*, Knoxville, 1946: University of Tennessee.

LINED BLOCKS

The second most popular design in Etowah Stamped pottery of the Early Mississippi period, and one of the two original motifs used by the decorators of this ware, consists of rectangular areas filled with parallel lines, these areas or "blocks" alternating in direction in such a way that the lines of each block are at right angles to those of adjacent blocks (Fig. 8, *c*). The line-filled areas are usually square; their size varies from about 1 cm. square to 5 cm. or more, the average being about 2 cm.

This Early Mississippi motif developed from an almost identical design in the Woodstock Stamped ware of Woodland times. The earlier blocks are usually larger and more elongated; they are either framed or the effect of framing is obtained by not permitting the ends of lines to abut against lines of adjacent blocks; their execution is sharper, producing the high relief or washboard effect (Fig. 11, *a*, *b*) seen also in Woodstock Stamped line-filled diamonds and ovals. These features, plus their typically Woodstock paste color, thickness, and surface texture, make them easily distinguishable from their Etowah Stamped successors.

LINKED DIAMONDS, OVALS, FIGURES-OF-EIGHT

I have mentioned a certain continuity between the Napier Stamped rectilinear designs and the superimposed triangles of Etowah Stamped. We can trace this sequence back farther into Woodland times by deriving another typical Napier motif, linked diamonds and ovals, from Woodstock Stamped line-filled diamonds, triangles, and ovals, or by deriving both from some as yet unidentified source.

As we have already seen, a popular Napier design is the braided or entwining sets of paral-

lel lines, about four or five lines in each set (Figs. 9, *b;* 10, *n*). While some of these are rectilinear, the braiding elements running in straight lines that cross each other at geometric angles, more often the course of the lines is curving and the chain of oval-shaped areas they enclose resembles a sort of continuous series of figure-eights. Whether the elements in the chain are diamond-shaped (Fig. 10, *s*) or oval, areas both inside and outside the strand are almost invariably filled with straight parallel lines.

Chains of ovals and diamonds occur in Woodstock Stamped, too (Fig. 10, *r*). The units may actually interlock, top and bottom, or they may merely touch each other.The chains thus formed are parallel to each other, and may touch at the outer side edges of the ovals. Again the space enclosed by the patterns and usually also the space outside them are filled with horizontal parallel lines.

The small Early Mississippi specimen shown in Fig. 10, *t* is simply an elaboration of the earlier Napier motif, the border lines being increased in number and the enclosed space reduced, though still filled with parallel lines as before. It seems likely that the Napier form developed from the Woodstock design, since the latter appears much earlier in northwest Georgia. Napier is always a minority ceramic group, probably a trade ware, in the Etowah Drainage sites we investigated, so we must not overlook the possibility that both Napier and Woodstock designs are derived from a third ware, such as Early Swift Creek farther south or up in the northeast; this seems unlikely, however, for Woodstock antedates Early Swift Creek at the Two Run Creek village site in Bartow County.

Somewhat similar design concepts are the interlocking circles of Etowah Stamped and the true figures-of-eight in Savannah and Lamar Stamped, but I do not believe the resemblance is significant. I do call attention, however, to striking similarity between the Woodstock Stamped line-filled ovals and the familiar Early Swift Creek "snow-shoe" motif, especially when the enclosed area of the latter is filled with parallel lines.

SIMPLE STAMPED

This decoration occurs in all archaeological phases in northern Georgia. The earliest is the Mossy Oak fine-line type, which often gives the impression of being scratched or brushed (Fig. 11, *e, f*). During Late Archaic and first Early Woodland, the sharply defined Deptford Simple Stamped becomes more popular (Fig. 11, *g*). It, in turn, is displaced by the Etowah Simple Stamped of Early Mississippi (Fig. 11, *h*), which degenerates in clarity of execution to become the well known Lamar Simple Stamped of Late Mississippi (Fig. 11, *d*). With the exception of some of the Deptford examples, which I am not at all sure were executed with a carved paddle, this was the simplest and probably the easiest design to prepare. It could certainly have been invented independently at any time, but I do not believe this was necessary.

CHECK STAMPED

This design appears a little later than the first occurrence of Mossy Oak Simple Stamped in northern Georgia, but it persists quite as long as the simple stamped technique. It steadily degenerates in sharpness of execution and in the variety of forms from the bold Deptford check and linear check of all sizes and many variations (Fig. 11, *j, l*) to the Early Mississippi specimens in Etowah technique (Fig. 11, *k*) and finally the large crude checks of Lamar Stamped (Fig. 11, *i*).

As in the ease of some of the bold Deptford simple "stamped" designs, some of our clearest Deptford check specimens look suspiciously non-paddled. In a great many cases one can detect very small impressions which resemble, more than anything else, certain types of interlocking weave elements in basketry. I am now taking imprints of these in plastic clay in the hope of determining whether they are really weave imprints, or whether these little marks are simply background scratches or other irregularities in the wood of the paddle.

SUMMARY

The evolution and persistence of certain ceramic designs in northern Georgia, and probably in adjacent areas also, have strengthened my belief, previously expressed in American Antiquity, that there was a strong native cultural continuity there from the late Archaic period up to historic times. Simple-stamped and check-stamped decoration endured throughout all archaeological periods, differing chronologically only in number of variations and in clarity of execution. Other motifs,

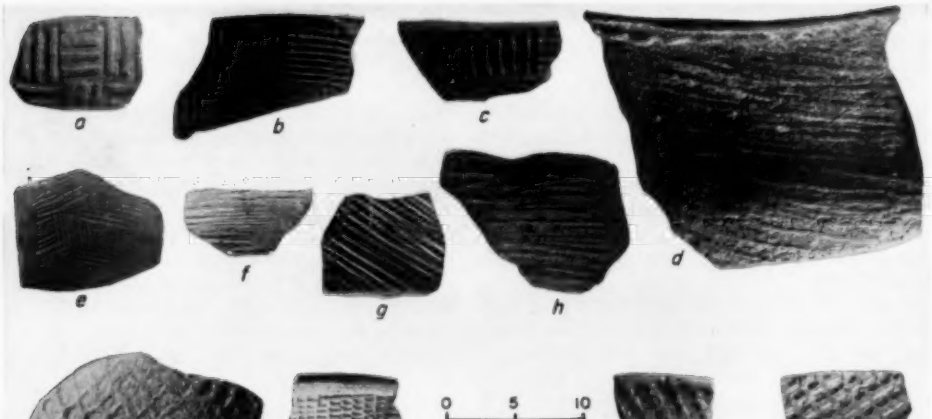

FIG. 11. North Georgia ceramic motifs: *a–c*, lined blocks (*a*, *b*, Woodstock, Early-Middle Woodland; *c*, Etowah, Early Mississippi); *d–h*, simple stamped (*d*, Lamar, Late Mississippi; *e*, *f*, Mossy Oak, Archaic; *g*, Deptford, Archaic-Early Woodland; *h*, Etowah, Early Mississippi); *i–l*, check stamped (*i*, Lamar, Late Mississippi; *j*, *l*, Deptford, Archaic-Early Woodland; *k*, Etowah, Early Mississippi).

such as the line-filled diamond or oval, chains of these elements, concentric circles, cross-in-circle, the line-filled squares and rectangles, the superimposed triangles, and the filfot cross, continued during two or more archaeological epochs. In certain cases, such as the superimposed triangles, we can trace by statistical methods the evolution of the design through as many as five definite stages of development. Execution techniques, as reflected, for example, in clarity or boldness of relief, and chronological criteria of paste, thickness, and surface texture are all correlated with these evolutionary stages, and here again we frequently find gradual trends that span archaeological periods. While foreign intrusions are recognizable, such as the Middle Mississippi and possibly the Savannah complexes, they soon disappeared or were absorbed; noded strap handles, for example, were employed on Etowah plain smoothed and incised vessels which had their own native and local development from earlier plain smoothed and incised pottery. The tradition of stamping never disappeared, even during the height of Mississippi influences and even at a ceremonial center as large as the Etowah site itself.

I am not quite sure to what extent we can measure general ethnic continuity in terms of ceramic continuity. Modern women of our own civilization seem much bolder than men in quickly adopting new fashions which seem to display no continuing evolutionary or gradual developmental stages, although these fashions definitely run in cycles. Modern woman's status and functions, however, are of course quite different from those of the average southern squaw. Perhaps in the aboriginal Southeast, important new cultural traits that appeared suddenly and are the criteria for many of our major archaeological period designations were exclusively male interests: new weapons, pyramidal mounds, cult paraphernalia, things adopted by conquered or converted men; while the ladies stayed at home and made pottery that changed only gradually as the generations passed. Or perhaps we might better look at our own china dishware to see an expression of conservatism in spite of almost annual changes in foreign policy, Kinsey attitudes, hemlines, and hairdos. Even the atomic age will probably not change our chinaware, except maybe to break more of it.

Middle American Research Institute
Tulane University
New Orleans, La.
October, 1949

THE JOHNS ISLAND SITE, HERNANDO COUNTY, FLORIDA

ADELAIDE K. AND RIPLEY P. BULLEN

DR. Antonio J. Waring, Jr., of Savannah, Georgia, dug a test trench at Johns Island in August, 1948. He discovered an upper zone of oyster shells containing sherds of the Weeden Island period and a lower zone of cemented fresh-water snail shells in which were large percussion-flaked tools but apparently no pottery.[1] At the conference on The Florida Indian and His Neighbors held at Rollins College, Winter, Park Florida, in April he called this site to the attention of the Florida Park Service and suggested that additional work would be worthwhile. We conducted excavations at the island in May, 1949, with two primary objectives: first, to determine the associations of the large stone tools; second, to secure data relative to a rise in sea level during or since occupancy.

Johns Island is located on the southern shore of the mouth of Chassahowitzka River in the extreme northwestern corner of Hernando County, Florida, about 50 miles north of Tampa (Fig. 13). To the west is Chassahowitzka Bay, to the southeast are extensive marshes. Islands towards the west are composed of mangrove trees growing where the water is very shallow.

GEOGRAPHICAL BACKGROUND

A knowledge of local conditions is necessary for a proper interpretation of the remains found at Johns Island. In one area both Waring and ourselves found oyster (and a few clam) shells lying over fresh-water snail shells (Fig. 14). This might imply a radical change in local conditions from fresh to brackish water, such as could be caused by a rise in sea level. In another area we found oyster (and a few clam) shells throughout the midden (Fig. 15). This suggests that a rise in sea level is not the only factor to be considered. Minor changes in local conditions may also have affected the ecology of shellfish, as will be shown below.

The Chassahowitzka region is underlaid by irregularly laminated limestone which contains a fair amount of sand. At Johns Island and other nearby marsh-surrounded islands, where this limestone outcrops, it breaks or erodes off in irregularly shaped slabs. As bedding planes are nearly horizontal, it seems safe to assume that this limestone was at one time continuous and that the outcrops seen today are erosional remnants. Water and marsh now fill the eroded areas.

Chassahowitzka Bay is rather shallow. In very few places is a depth greater than 4 feet below mean low water indicated for this area on the Anclote to Crystal River sheet (U.S.C. and G.S., 1258). Most of the bay is substantially shallower. It is evident that a rise in sea level of a few feet would profoundly affect the coast line and also hasten erosion of the limestone. The region around Chassahowitzka Bay impresses one as representing a drowned shoreline, which may in part be the result of a depression caused by the weight of sediments deposited by the Mississippi River.[2] Evidence for a rise of at least 1½ feet in level since the site was first occupied will be presented later.

The Chassahowitzka River deposits mud, principally in the region where the river widens, 1½–2 miles northeast of Johns Island (Fig. 13). This mud is periodically scoured from the flats by hurricanes. The salinity of the water from the northeastern edge of the marsh, 2½ miles northeast of Johns Island, to the mangrove islands to the west varies with rainfall. When we were there the water at the island, while brackish, could, if necessary, have been drunk. Fresh-water snails meander up and down the river and marsh depending upon the freshness of the water. Mr. Allison B. Strickland of Chassahowitzka, who has been familiar with the river since 1910 and is our authority for much of the above, says that he has occasionally found fresh-water snails on the islands to the west of Johns Island.

The marshes also indicate the presence of fresh water. While primarily consisting of the salt-loving black rush (*Juncus roemarinaus*) with patches of salt grass (*Distichlis spicata*) and scattered cord-grass (*Spartina*, probably, *S. alternifolia*) towards the gulf, they are all bordered with saw grass (*Mariscus jamaicensis*), which requires some fresh water. This border

[1] Waring, n.d., personal communication.

[2] See Rouse (n.d.) for a résumé of pertinent geological literature.

of saw grass is found on the large marsh island southwest of Johns Island (Fig. 13, below the "zka" of Chassahowitzka Bay). Towards the wooded swamp, where the water is fresher, *Sagitaria lancifolia* and some hibiscus are mixed with the saw grass edging the marsh.[3]

Oysters and clams are rare today in Chassahowitzka Bay. Judging from the midden at Johns Island, oysters were plentiful during Indian occupancy. No doubt mud deposited by the river has killed off the oysters and the water is too fresh for clams. Apparently, either oysters or fresh-water snails might be expected in the mouth of the Chassahowitzka River depending on the salinity of the water and the amount of mud. While a rise in sea level has occurred, it is not the only factor affecting the ecology of shellfish at and near Johns Island.

Our data do not indicate the temporal relationship between the zone of snail shells in Test I and the relatively deeper, lower zone of oyster shells in Test II. A trench between these tests cannot at present be dug because of a large cottage (Fig. 13). Pending such additional evidence, we can only assume these zones to be approximately contemporaneous, as is suggested by their industrial content. The foregoing geographical discussion would seem to agree with this assumption.

While conditions in respect to shellfish have varied, other sources of food have probably remained more constant. Fish and birds abound in the region. Turtles are still captured at the islands near the gulf. Deer, while presumedly not as abundant as formerly, have been killed on the marsh behind Johns Island. The nearby wooded swamp, where bear have been taken since 1910, supplied the Indians with a rich game preserve, as well as some vegetable food. Although land suitable for agriculture is at a premium in the neighborhood, the Chassahowitzka Bay region offered abundant resources for the hunter and collector of food.

When first visited by Mr. Strickland in 1910, the northwestern side of Johns Island extended about 20 feet further into the bay and ended in a steep bluff some 6 feet in height. Erosion from tides and storms have reduced the island to its present size. Heavier materials, large chips, stone tools, and sherds, have been left behind to form a beach, while lighter materials have been redeposited to the northeast forming a low easterly extension of the island (Figs. 12, *a*; 13).

Bushels of stone artifacts and pottery are said to have been taken from this beach. A large collection was also made by us. Most of this debris is to be found in front of the red cottage and under the wharf (Figs. 12, *b;* 13). In front of the next cottage to the northeast, limestone outcrops on the beach. In places snail shell breccia is still to be seen cemented to this limestone outcrop.

EXCAVATIONS

Johns Island, except for the recent extension to the northeast, consists entirely of a midden deposit resting on limestone. Our work comprised two main trenches and supplementary investigations as indicated on the map (Fig. 13). Top of a U.S.C. and G.S. triangulation marker was used as a datum for elevations. Excavation was by arbitrary 6-inch levels, which were divided where natural stratigraphy was evident. Test I with its northwestern extension was 5 by 15 and Test II 5 by 10 feet. Thickness of debris above the limestone was 4 feet in Test I and 5 feet in Test II. Stakes A, B, C, and D were hammered flush with the surface and left as reference points for possible future work.

MAIN EXCAVATIONS

Southwestern profiles of our trenches are shown in Figures 14–15. Percentages of black dirt and shells, indicated on these profiles, have been averaged from estimates made in the field. The top zone of oyster shells shown for the southeastern part of Test I (Fig. 14) should be disregarded. It is believed that these shells represent reworked spoil from Waring's excavation. The top six inches of Test I produced recent nails, fragments of glass, and cartridges. One cartridge was in the top 6 inches of Test II.

In Test I and its northwestern extension, percentages of shell above the breccia varied from 20 to 65 with the greatest concentration in the 6-12 inch level. These shells were predominantly those of the oyster (*Ostrea virginica*, Gmel) plus some of a small clam (*Polymesoda*[?] sp.).[4] Ratio of oyster to clam shells was about three to one. A few conch shells (*Melongena*

[3] Plant identifications by Dr. John H. Davis, Professor of Botany, University of Florida.

[4] Small clam and scallop shells kindly identified by Mr. William J. Clench, Museum of Comparative Zoology, Cambridge.

FIG. 12. Views of the Johns Island site, Florida. *Top*, the island and the marsh as seen from Chassahowitzka Bay; May Island in background. *Bottom*, beach at Johns Island, red cottage on right.

corona) and fragments of Busycon shells were present. These were evenly distributed vertically. Also in this trench were a left-handed whelk shell (*Busycon perversum*, Linn.), a fragment of a cockle shell (*Dinocardium robustum*, Sol), part of a giant tulip shell (*Fasciolaria gigantea*, Kien), and a large clam shell (*Venus campechiensis*). The last two were at the top of the breccia and the cockle between depths of 18 and 24 inches.

The lowest zone of Test I was composed of a breccia formed from cemented fresh-water snail shells (*Pomacea paludosa*, Say). The vast majority of these shells were crushed and identification is based on the remaining whole shells. Included in this breccia were some mussel, oyster, clam, and conch shells, and fragments of Busycon shells. These shells, while not at all common, were present to the very bottom of the breccia. Also present were a few shells of another fresh-water snail (*Vivipara contectoides*, Binn) and of a land snail (*Euglandina rosea*, Ferussac). Cemented into the breccia were chips and food bones. Sherds, while present, were extremely rare.

The surface of the breccia was very irregular (Fig. 14). Several narrow and deep holes, filled with black dirt, led downward from this surface. While these holes are suggestive of postholes and no other explanation can be given for them, it is believed they are not postholes, as some of them had irregular sides and were substantially wider at their bases. Numerous deposits of similar black dirt entirely enclosed

by breccia were also found. The lower foot of this breccia was wet, contained more black dirt than that higher up, and was less consolidated.

In Test II shells in the top 6 inches represented about 90 per cent of the deposit. This percentage gradually decreased to 20 at a depth of 42 inches. Below that depth shells comprised about 50 per cent of the debris. The ratio of oyster to clam shells in this trench was about five to one. As before a few conch shells and fragments of Busycon shells were evenly distributed vertically. A large clam shell (*Venus compechiensis*) was found between depths of 48 and 54 inches. A number of scallop shells (*Pecten irradians*, Lamark) were present in the lowest 2 feet of Test II. Practically all were perforated by holes knocked from the inside outwards. No fresh-water snail shells were found in this trench nor above the breccia in Test I.

Chips, food bones, and sherds were plentiful in the debris, except that sherds were extremely rare in the breccia. In Test I both chips and food bones (deer, turtle, fish, and bird) were more prevalent between depths of 12 and 24 inches than above or below. The jawbone of a raccoon was in the top 6 inches of this test. A bear's tooth was also found. What may be the coprolite of a dog was found in the 30-36 inch level of the extension of Test I. The only alligator bones found were in the lowest foot of the breccia.

In Test II animal bones were fairly evenly distributed vertically although a little more common in the lower half of the deposit. In this test chips increased substantially below a depth of 2 feet. They were most abundant between depths of 36 and 42 inches.

In both trenches deer and turtle bones considerably outnumbered those of fish or bird. Among fish bones those of the drum could be identified. All chips and chipped stone artifacts from the site were made of chert. The vertical distribution of sherds and artifacts of bone and stone will be discussed later.

The surface of the limestone was irregular and pitted with holes. These holes were filled with breccia in Test I and with black dirt and fragments of oyster shells in Test II. As mentioned earlier this limestone had a laminated structure. Small slabs of it were found in the lower portions of the deposits of both trenches.

To summarize, data from these tests indicate that three stratigraphic zones were present

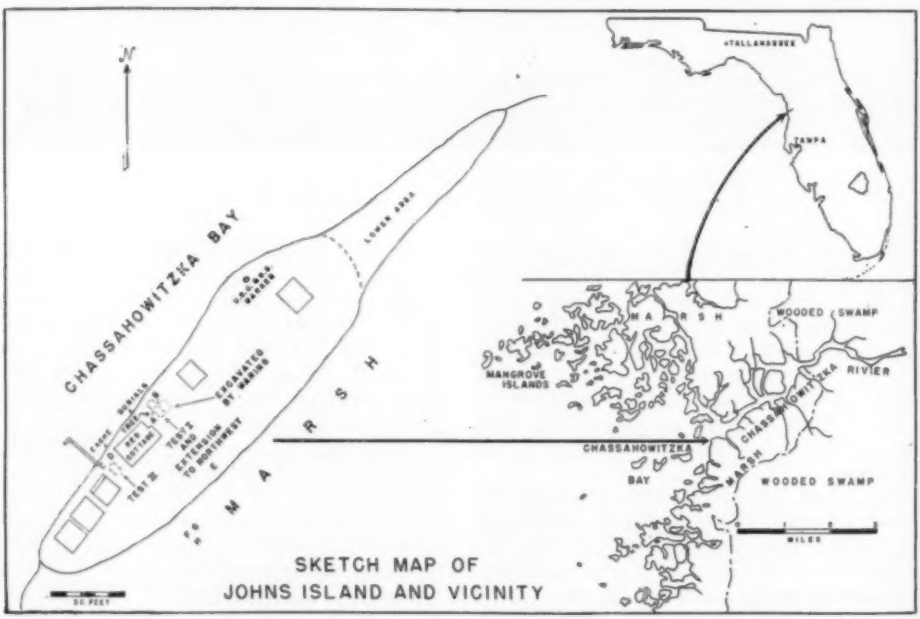

FIG. 13. Sketch map of Johns Island, Florida and vicinity.

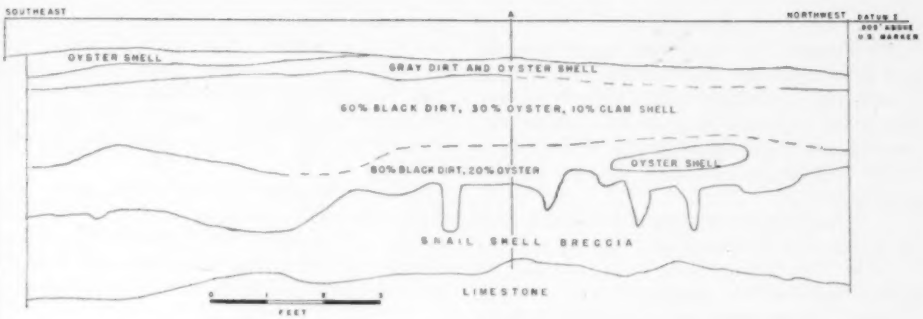

FIG. 14. Profile of southwest wall of Test I, Johns Island, Florida.

in both trenches—a superior zone composed of black dirt and a fair number of shells, an intermediate zone of black dirt containing relatively few shells, and an inferior zone which in Test I was comprised of cemented fresh-water snail shells and in Test II consisted of oyster shells and black dirt (cf. Figs. 14 and 15). In the pottery tables, given later, these zones have been indicated for comparative purposes.

SMALL TESTS

Supplementary small tests were dug at locations indicated on the map by *E*, *F*, *G*, and *H* (Fig. 13). At *E*, where the surface of the ground was 33 inches lower than in Test I, a deposit of black dirt, oyster shells, chips, sherds, and animal bones, 20 inches thick, was found to rest directly on the limestone.

At *F*, deer and turtle bones, bits of shell, chips, and sherds were found between 20 and 32 inches below the present surface of the marsh. Included were one Swift Creek Complicated Stamped, one simple stamped, one plain sand-tempered, six Pasco Plain, and two St. Johns Plain sherds.

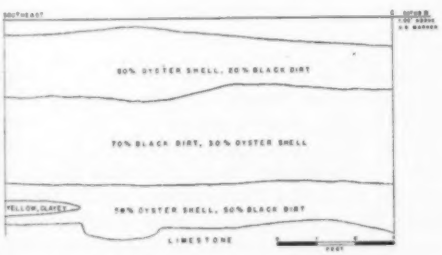

FIG. 15. Profile of southwest wall of Test II, Johns Island, Florida.

The following descriptions of tests at *G* and *H* are taken from the field notes of Dr. John H. Davis, Professor of Botany, University of Florida, who was present when these tests were dug. At *G*, the upper 14 inches of marsh consisted of fibrous type peat. Between 14 and 22 inches was a more plastic peat with only a few living roots but also some black dirt. Sherds, chips, deer, turtle, and fish bones occurred between 22 and 35-40 inches in black dirt containing decayed roots. Sherds included three Pasco Plain and two sand-tempered plain. At 35–40 inches marl, overlying limestone, was encountered. Surface of the latter was pitted and pocketed.

Test *H* was made in an open part of the marsh where salt-grass (*Distichlis*) was growing. Apparently a deep pocket in the limestone lay below. The top 12 inches consisted of fibrous peat plus a little plastic peat. The next 16 inches was composed of plastic peat with some roots and black dirt. Specimens, while not as plentiful as at *F* and *G*, were in the 28-31 inch zone. These included chips, turtle and fish bones, and four sherds—one sand-tempered plain, one Pasco Plain, and two St. Johns Plain. Below these artifacts to a depth of 5 feet was plastic peat which became sandier with depth. Between 5 and 6 feet was dark, organic-impregnated sand. Below to an undetermined depth was a heavy marl, containing sand.

Interpretation of these tests is difficult. The fairly level base of the artifact-producing zone, at depths of 31-35 inches, suggests that this elevation was the top of the marsh at some period during occupation of Johns Island. The location of the shallowest cultural materials indicates that the marsh has grown about 20 inches since their deposition.

BURIALS

A cottage, since destroyed, once occupied part of the space between the last two cottages towards the northeast on Johns Island (Fig. 13). One of the postholes, dug for its construction, uncovered a skull. Subsequently, a garden occupied this space. This area was not investigated by us.

On the northwestern shore of the island, near the upper edge of the present beach, parts of three or four burials have been exposed by wave action (Fig. 13, burials). We removed one of these. Others were not excavated because of probable resulting damage to the shore line.

While bones had been protected by shells from ground acids, many were broken as a consequence of their recently exposed position. Bones of the left hand and foot were missing, probably due to wave action. All that remained of the skull was a portion of the left maxilla. However, it and the other remaining bones were still *in situ*, so that the position of the burial could be ascertained.

The body had been deposited in a pit, approximately 40 inches long, 20 inches wide, and at least 15 inches deep. The elevation from which this pit had been dug could not be determined due to erosion of the shore. The individual had been buried in a semi-sitting position, facing west, with the sacrum occupying the lowest part of the pit. Vertebrae led upwards towards the head, which was apparently bent forward over the chest. Arms were at the sides with elbows bent. Bones of the right hand lay beside those of the pelvis. Legs were semi-flexed with knees high. The right tibia was bent backwards over the left femur.

From the size of the bones, shape of the innominate bone, and presence of highly developed pre-auricular sulci, it is believed this burial was that of a middle-aged female. Tooth wear is pronounced but not excessive. The one available incisor tooth is shovel-shaped.

In the fill of the burial pit, presumedly accidentally, were several chips; the basal portion of a large triangular knife(?) with a 3.8 cm. basal width; a columellar chisel(?); a fragment of Busycon and a piece of turtle shell; one punctated (Carrabelle Punctated?), one crisscross incised, one St. Johns Plain, and two Pasco Plain sherds.

CACHE

In the fall of 1948, Mr. James L. Strickland of Chassahowitzka found a cache of seven large percussion flaked tools on the beach (Fig. 13, *cache*). He reburied these tools as found and did not dig below them. Upon being shown the location, we removed this cache and investigated the deposit around and below it. Tools from the cache are illustrated in Figure 16.

The undisturbed matrix surrounding the cache was only superficially reworked by wave action and consisted of shells and black dirt like that found in the lowest zone of Test II. It contained many large chips; two large fragments of worked chert; food bones; four pieces of worked deer bones, including the tip of a bone dagger; eleven sherds of Pasco Plain; and two plain sand-tempered sherds. In a position which suggested association with the cache was the head of a bone dagger (similar to Fig. 20, *b*). Below the cache, at substantially greater depths, were four sherds (plain sand-tempered, Pasco Plain, Pasco Interior Slipped, and Pasco Incised), another fragment of a bone dagger, a bone awl, and a piece of sawed turtle bone.

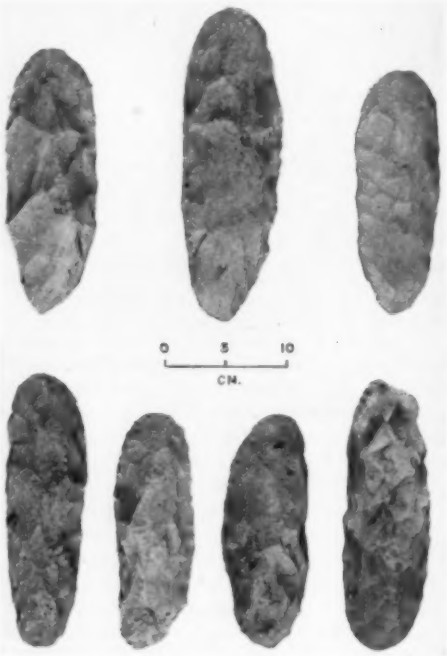

FIG. 16. Large adze-like tools from cache at Johns Island, Florida.

COLLECTIONS

POTTERY

A total of 1,862 sherds were found in the two main trenches. These have been classified and the results presented in Tables 1–3. Sherds from Test I and its northwestern extension have been treated separately, as excavated, because of the difference in elevation of the top of the breccia in these two areas.

In Table 1 the 30-36 inch level of Test I has been divided into two parts: 30-32 inches includes sherds found while cleaning off the top of the breccia; 32-36 inches covers sherds from the upper 4 inches of this breccia. Similarly for Test II (Table 3) the 36-42 inch level has been divided. In this case, 36-38 inches includes sherds found above and while uncovering large stone tools (Fig. 18, *e–m*), and 38–42 inches covers sherds below this concentration of tools. Sherds in the column headed "With Tools" were included in a picture (not reproduced) of these tools *in situ*.

Data from Tables 1–3 have been condensed in Table 4, giving a summary by pastes. The dominance of Pasco paste in the lowest and intermediary zones and its continuance as a very large percentage in the highest zone is evident. The decrease with time in the quantity of chalky sherds and the increase in sand-tempering will also be noted.

Discussion of Types

Except as noted below, pottery classification follows Willey and Woodbury, Willey, Goggin, J. B. Griffin, and J. W. Griffin and Smith.[5] In the tabulations, pottery types have been arranged under various pastes. Presence of some limestone aplastic in sherds of Wakulla Check Stamped and other Weeden Island types might prevent their classification, strickly speaking, under the types indicated. However, the similarities are otherwise so close that it seems better to handle the problem in this way than to introduce more new names for closely related pottery types.

Two illustrations of Wakulla Check Stamped are included in Figure 17 to show the range of variation. Very few sherds of this type had medium sized checks like *d*. Most were extremely fine like *c*. Deptford Cross Simple Stamped sherds are included by Willey under Deptford Simple Stamped.[6] We have segregated out the cross-simple stamped sherds for descriptive purposes and possible future significance. On these sherds the width of stamped indentations are about 3 mm. in both directions, leaving raised areas, 3–4 mm. wide and 1–2 mm. high. Stamping tends to be at right angles (Fig. 17, *m*).

New pottery types, Hernando Check Stamped, Strickland Over-stamped, Strickland Scored, Pasco Interior Slipped, and Pasco Incised are defined below. Various unique sherds were found. One such incised sherd (Fig. 17, *h*) is reminiscent of Indian Pass Incised. Five sherds of Pasco paste have extremely irregular surfaces with a suggestion of deep, parallel grooves crudely rubbed-out. These came from the 24-36 inch level of Test II and, although divergent, have been included under Pasco Plain in the table. A unique 2-line Pasco Incised sherd is illustrated (Fig. 17, *u*). The fabric-impressed and linear check-stamped sherds of St. Johns paste may also be mentioned.

Attention is called to two incised and four punctated sherds made of micaceous paste. The former (Fig. 17, *j*) has a scalloped or notched lip typical of the Santa Rosa-Swift Creek period of the Florida gulf coast.[7] The latter (Fig. 17, *s–t*) exhibits areas filled with small, round punctations. While reminiscent of Weeden Island Punctated we have not so classified them because of the paste and of stylistic differences in the punctations.

Sherds collected on the beach include Weeden Island Plain, Swift Creek Complicated Stamped, St. Andrews Complicated Stamped, Carrabelle Incised, Hernando Check Stamped, Gulf Check Stamped, Deptford Linear Check Stamped, Deptford Cross-Simple Stamped, St. Johns Plain, St. Johns Incised, Pasco Incised and a great many Pasco Plain. One unique Pasco Incised rim sherd bears extremely fine, incisions, 0.25 mm. wide. These lines are arranged perpendicularly and obliquely, both right and left, to the lip. Another sherd of Pasco paste has a decorated rim which is bent inward. On this rim are three parallel rows of punctations, each 1 by 4 mm. One Pasco In-

[5] For pottery types of the Florida west and northwest coasts, see Willey and Woodbury, 1942; Willey, 1945, 1948, 1949. For Matacumbe Incised, see Goggin, 1944; for Pasco series, Goggin, 1948*c*; for St. Johns series, Griffin, 1945, Goggin, 1948*c*; for St. Johns Simple Stamped, Griffin and Smith, 1949.

[6] Willey, 1949.

[7] *Ibid.*

TABLE 1. VERTICAL DISTRIBUTION OF SHERDS IN TEST I

Stratigraphic Zones	*Oyster Shell*			*Black Dirt*			*Breccia*			*Limestone*
Depths Below Surface in Inches	*0–6*	*6–12*	*12–18*	*18–24*	*24–30*	*30–32*	*32–36*	*36–42*	*42–48*	
Shell-tempered paste:										
Plain	5									
Pinellas paste:										
Pinellas Plain	15									
Sand-tempered with some limestone inclusions:										
Wakulla Check Stamped	31									
Swift Creek Complicated Stamped, Late Variety	20									
Indistinct stamped	11						1			
St. Andrews Complicated Stamped	1									
Ruskin Dentate Stamped	1									
Keith Incised		1								
Weeden Island Plain	4									
Smooth Plain	30		2	2						
Hernando Check Stamped	3*									
Miscellaneous incised	1			1						
Miscellaneous punctated	1			1	1					
Plain	40	4	12	7	9		4	2		
Sand-tempered paste:										
Carrabelle Incised		1	2	1						
Miscellaneous check stamped		1		1	3					
Simple stamped			1							
Deptford Simple Stamped				1	1					
Plain	51	7	12	10	9	2	2	1		
Micaceous paste:										
Plain			1	1						
Pasco paste:										
Pasco Check Stamped	2									
Pasco Interior Slipped				3	1		1			
Pasco Incised			1	1†			2			
Pasco Plain	37	5	42	73	51	9	13	7		
St. Johns paste:										
St. Johns Check Stamped	1									
Linear check stamped (Fig. 17, *p*)				2						
Fabric impressed (Fig. 17, *o*)					1					
St. John Simple Stamped				1						
St. Johns Incised					2		2	4		
St. Johns Plain	3	2	4	10	8	2	8	6	2	
Totals	257	21	77	115	86	13	33	20	2	

* Includes one of coarse check variety.

† Carrabelle Incised type of decoration.

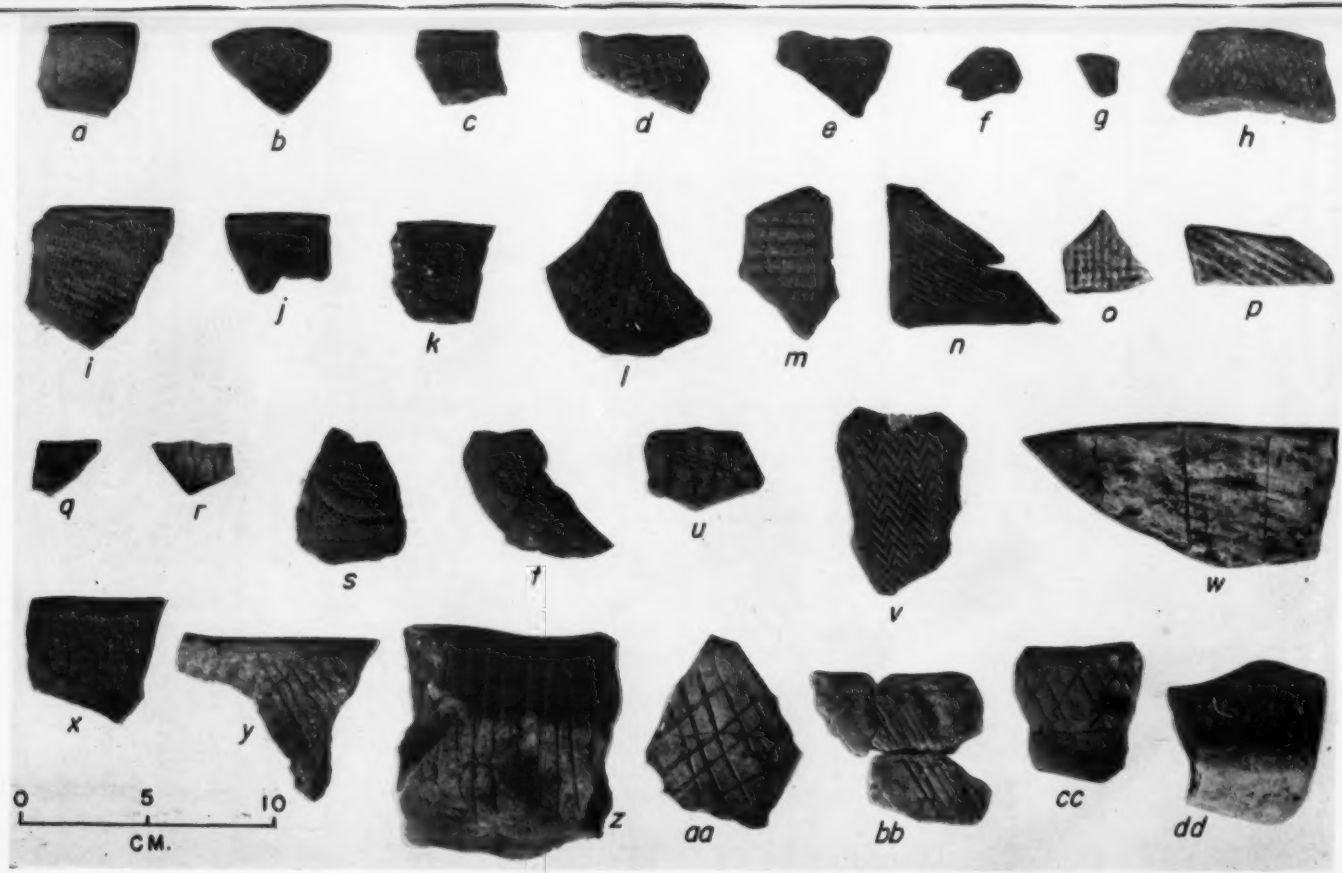

FIG. 17. Sherds from Johns Island, Florida, arranged approximately by stratigraphic zones. *a*, Keith Incised; *b*, Ruskin Dentate Stamped; *c*, *d*, Wakulla Check Stamped; *e*, Swift Creek Complicated Stamped (late variety); *f*, *g*, St. Andrews Complicated Stamped; *h*, unique incised; *i*, Hernando Check Stamped; *j*, unique incised, micaceous paste; *k*, Pasco Plain; *l*, Strickland Overstamped; *m*, Deptford Cross-Simple Stamped; *n*, St. Johns Simple Stamped; *o*, fabric-impressed, St. Johns paste; *p*, linear check-stamped, St. Johns paste; *q*, Thomas Simple Stamped; *r*, Matacumbe Incised; *s*, *t*, unique punctated, micaceous paste; *u*, unique Pasco 2-line Incised; *v*, Crooked River Complicated Stamped; *x*,*y*, Pasco Incised; *w*, *z*–*dd*, St. Johns Incised.

TABLE 2. VERTICAL DISTRIBUTION OF SHERDS IN THE NORTHWESTERN EXTENSION OF TEST I

Stratigraphic Zones	*Oyster Shell*		*Black Dirt*		*Breccia*				*Limestone*
Depths Below Surface in Inches	*0–6*	*6–12*	*12–18*	*18–24*	*24–30*	*30–36*	*36–42*	*42–47*	
Pinellas paste:									
Miscellaneous incised	1								
Pinellas Plain	1								
Sand-tempered with some limestone inclusions:									
Wakulla Check Stamped	12	1							
Indistinct stamped		3	1						
St. Andrews Complicated Stamped		1							
Carrabelle Punctated		1			1				
Smooth Plain	1	7		5					
Miscellaneous incised	1								
Hernando Check Stamped		4*	7	2	1				
Perice Linear Punctated					1				
Plain	11	20	21	22	4	1	1	1	
Sand-tempered paste:									
Smooth Plain	2								
Indistinct stamped		1	3						
Miscellaneous incised	1	1							
Gulf Check Stamped			1		1				
Deptford Bold Check Stamped		1		2					
Deptford Simple Stamped		1	1	2				1	
Plain	11	8	14	15	1				
Micaceous paste:									
Unique incised (Fig. 17, *j*)				2					
Pasco paste:									
Flat rim appendage					1				
Fasco Interior Slipped		2	3		3				
Pasco Incised				2	1				
Pasco Plain	16	64	80	72	17	8	1		
St. Johns paste:									
Linear check stamped (Fig. 17, *p*)				1					
St. Johns Simple Stamped			3	2					
St. Johns Plain	1	1	12	9	1		1		
Totals	58	116	146	136	32	9	3	2	

* Includes one of coarse check variety.

cised and two St. Johns Incised sherds show a distinct bend of vessel wall just below the decoration (Fig. 17, *dd*), similar to that found among vessels of Orange Incised.

HERNANDO CHECK STAMPED

Definition as a type: This paper; see Figure 17, *i*.

Paste:

Method of manufacture: By some annular method of vessel building.

Temper: Fine sand and some crushed limestone.

Texture: Well mixed and compact but some contortion.

Hardness: 3.5–4.0.

Thickness: 6–9 mm.

Color: Cores generally black; outer third sometimes oxidized. Surfaces gray to tan.

Surface finish and decoration: Inner surfaces well smoothed, possibly slipped. Outer surfaces impressed with carved paddle or similar tool, producing small rectangular indentations, 1×2 to 1×5 mm. Lands are 0.5–1.0 mm. wide, those in one direction being slightly wider than those in the other direction. Paddle apparently applied

TABLE 3. VERTICAL DISTRIBUTION OF SHERDS IN TEST II

Stratigraphic Zones	*Oyster Shell*			*Black Dirt*						*Oyster Shell*			*Limestone*
Depths Below Surface in Inches	*0–6*	*6–12*	*12–18*	*18–24*	*24–30*	*30–36*	*36–38*	*With Tools*	*38–42*	*42–48*	*48–54*	*54–60*	
Pinellas paste:													
Pinellas Plain	19	3											
Sand-tempered, some limestone:													
Wakulla Check Stamped	7*	6*											
Swift Creek Complicated Stamped, Late Variety	3												
Indistinct stamped	4												
Weeden Island Plain	1												
Smooth Plain	1												
Unique incised (Fig. 17, *h*)			1										
Thomas Simple Stamped									1				
Matacumbe Incised							1		1				
Hernando Check Stamped	2*									1			
Plain	33	8	4	8	10	13	2		2	5		5	
Sand-tempered:													
Smooth Plain	2												
Fabric impressed			1										
Crooked River Complicated Stamped, early variety								2					
Unnamed small check stamped					3								
Deptford Simple Stamped				1									
Deptford Cross Simple Stamped						3	1						
Strickland Overstamped					1	9	8						
Strickland Scored					1				2	2	4		
Unique roughened							1						
Unique incised									1				
Indistinct stamped										1			
Plain	19	4	3	6	7	13			1		1	5	
Micaceous paste:													
Unique punctated (Fig. 17, *s–t*)							3		1				
Plain			1										
Pasco paste:													
Smooth plain					4		2						
Miscellaneous punctated			1										
Miscellaneous dentated									1				
Pasco Interior Slipped			1	1	4	16	21	3	34	7	1	1	
Unique 2-line Pasco Incised								1					
Pasco Incised									1	5	12		
Pasco Plain	10	13	33	51	49	60	17	6	32	21	22	25	
St. Johns paste:													
St. Johns Check Stamped		1											
Biscayne Roughened					1								
St. Johns Incised								1	1	2	1	1	
St. Johns Plain	2			1	1	2			1	6	10	2	
Totals	103	35	45	68	81	116	56	13	79	50	51	39	

* Check has linearity.

† Includes one of coarse variety.

TABLE 4. SUMMARY OF PASTES BY STRATIGRAPHIC ZONES

Paste	*Upper Zone: Oyster Shell*		*Intermediate Zone: Black Dirt*		*Lower Zone: Snail or Oyster Shell*	
Shell-tempered	5	0.7%				
Pinellas	39	5.5%				
Sand-tempered with limestone inclusions	294	41.3%	117	12.9%	28	11.6%
Sand-tempered	130	18.2%	126	13.8%	19	7.9%
Micaceous paste	2	0.3%	7	0.8%		
Pasco (limestone)	227	31.9%	598	65.8%	148	61.4%
St. Johns (chalky)	15	2.1%	61	6.7%	46	19.1%
Totals	712	100.0%	909	100.0%	241	100.0%

when clay fairly damp with some smoothing afterwards, which partially obliterates checks in places. Stamping neatly done with very little overlapping. Distribution apparently over entire vessel exterior.

In a variant, represented by only three sherds, all from the upper zone, checks are larger, 2×6 mm., and lands 1.0–1.5 mm.

Form:

Body: Unknown.
Rim: Slightly incurving (one example).
Lip: Simple, rounded.

Relationship of type: Hernando Check Stamped is similar to but much finer than, Gulf Check Stamped, of which it may be a regional variant.

STRICKLAND OVERSTAMPED

Definition as a type: This paper; see Figure 17, *l*.

Paste:

Method of manufacture: Unknown; no "coil fractures" present.
Temper: Medium large amounts of quartz sand.
Texture: Well mixed, compact, but contorted.
Hardness: 4.0.
Thickness: 5–7 mm.
Color: Black to gray-buff.

Surface finish and decoration: Surfaces have a fine sandy texture. Outer surfaces malleated with carved paddle or similar tool. All sherds exhibit overstamping, making delineation of details difficult. Tool was apparently carved to produce indentations consisting of parallelograms about 2×5 mm. in size. Stamping apparently covered entire vessel exterior.

Form:

Body: Unknown.
Rim: Straight and vertical.
Lip: Slants downward outwardly. Decorated with small, closely spaced, rounded-bottom notches.

Relationship of type: Paste, rim treatment, and stratigraphic position at Johns Island are suggestive of a Santa Rosa-Swift Creek time horizon.

STRICKLAND SCORED

Definition as a type: This paper.

Paste:

Method of manufacture: "Coil fractures" indicate building up of vessel by means of annular rings, 2.5–3.0 cm. in width.
Temper: Medium large amounts of quartz sand.
Texture: Well mixed, compact, but contorted.
Hardness: 4.0
Thickness: 6–9 mm.
Color: Black to gray-buff.

Surface finish and decoration: Inner surfaces well smoothed. Outer surfaces covered with scoring marks, 3 mm. maximum width.

Form: No information available.

PASCO PLAIN

Definition as a type: Goggin, 1948. Following description refers to sherds from Johns Island; see Figure 17, *k*.

Paste:

Method of manufacture: A few fractures suggest segmental building.
Temper: Very heavily tempered with crushed limestone.
Texture: Well mixed but coarse. Temper represents 20–60 per cent by volume.
Hardness: About 2.
Thickness: 5–11 mm.; usually 7–8 mm.
Color: Black, gray, and gray-buff.

Surface finish: Interior surfaces smoothed. Some smoothing marks unobliterated. Exterior surfaces rough, uneven, and poorly smoothed. Some exterior surfaces apparently smoothed by hand; others have faceted appearance similar to Belle Glade Plain. Smoothing done when paste was tacky. Much protruding temper.

Decoration: None

Form:

Body: Large, open-mouthed vessels with rounded bottoms may be suggested. Three rim sherds indicate a mouth diameter of 28 cm.
Rim: Slightly incurving or outsloping.
Lip: Simple, rounded; sometimes slightly flattened.
Appendages: One flat rim appendage found.

PASCO INTERIOR SLIPPED

Definition as a type: This paper.

Paste: As for Pasco Plain.

Surface finish and color: Exterior surfaces as for Pasco Plain but less rough. Gray in color. Interior surfaces very well smoothed and probably slipped. Red to buff in color.
Decoration: None.
Form:
Body: Unknown, probably same as for Pasco Plain.
Rim: Slightly incurving.
Lip: Flattened.

PASCO INCISED

Definition as a type: This paper; see Figure 17, *x*, *y*.
Paste: As for Pasco Plain.
Surface finish: Similar to Pasco Plain but less rough.
Decoration:
Technique: Incised, parallel lines, about 1.5 mm. in width.
Design: Lines perpendicular to lip (Fig. 17, *x*) or alternating areas of left and right sloping lines (Fig. 17, *y*).
Distribution: In band around vessel extending downward from lip a distance of about 6 cm.
Form:
Body: On some sherds there is a distinct inward slant to outside of vessel at about 7.5 cm. below lip, suggesting a flattened conical body.
Rim: Slightly incurving to slightly outcurving.
Lip: Simple, rounded.
Relationship of type: Execution and design of decoration shows close relationship to St. Johns Incised and to Orange Incised.

Discussion of Tables

Percussion flaked tools were found in the snail shell breccia of Test I and in the lower concentration of oyster shells in Test II at depths of 38 inches and greater. It is evident from these tables, as well as from the location of the cache mentioned earlier, that such tools were used at Johns Island in a ceramic horizon. St. Johns Plain, St. Johns Incised, Pasco Plain, Pasco Incised, Strickland Scored, and some Pasco Interior Slipped sherds were associated with these tools in Test II. The same pottery types, except for Strickland Scored, will be noted for the breccia of Test I.

The 36-42 inch level of Test II may be considered as transitional between this lowest zone and an intermediate zone where new pottery types appeared. These include stamped wares usually considered typical of both Deptford and Santa Rosa-Swift Creek periods, as well as other types previously unknown. Presumedly these sherds, chiefly sand-tempered, represent trade pieces made elsewhere while the Pasco series formed the dominant local ceramics, Pasco Incised and St. Johns Incised were no longer present at this time. A similar intermediate period is indicated for Test I (Tables 1 and 2), but the range of pottery types is much more restricted. In all cases, an absence of sherds of Swift Creek Complicated Stamped, early variety, should be noted.

It is interesting to note the relatively deep provenience of Carrabelle Incised and Punctated sherds. These Weeden Island types occurred, at least in this area, in pre-Weeden Island times. It may also be noted that there is little evidence of any period after the introduction of complicated stamping when check stamping was not present in some form or other.

The final period, as represented in all three tabulations, is clearly Weeden Island, but it is neither Weeden Island I nor Weeden Island II as these terms have been defined.[8] Sherds typical of the Safety Harbor-Ft. Walton period are also present in the highest zone.

The tests at Johns Island supply our first stratigraphic data for the Central Gulf Coast north of the Tampa Bay area. Information from other nearby sites must be obtained before they can be properly evaluated. Nevertheless, these data indicate that the recent extension of the Northwest Gulf Coast ceramic periods to *all* of the Central Gulf Coast will have to be revised or else the concept of culture period as now used in Florida modified to agree with new facts.[9]

PERCUSSION FLAKED STONE TOOLS

Over a hundred whole and fragmentary stone tools were collected from the beach at Johns Island and 25 more were uncovered in the excavations. To these should be added seven from the cache mentioned earlier. This stone industry, typical of the earlier period at the island, is based on a ridged or "hump-backed" blank. Large and small adze-like tools, rectangular adze-like scrapers, large scrapers, and picks were made from such blanks, predominately by percussion flaking. By-products of the industry, flakes, were occasionally retouched into knives and scrapers. Except where otherwise indicated, the specimens described below were collected from the beach.

Description of Tools

Raw material. Three nodules of chert, 5.0–10.5 cm. in maximum dimension, while small, are

[8] Willey and Woodbury, 1942, p. 253; Goggin, 1947, p. 117.

[9] Goggin, 1949, temporal chart.

presumed to be typical of raw material brought to the site for the manufacture of tools. One was found in the matrix surrounding the cache, one in the middle of the breccia zone of Test I, and the third in Test II between depths of 48–54 inches.

Cores. Two fragments of chert, 8.5–12.0 cm. across, with flakes removed from all surfaces, are presumed to be cores. They do not exhibit any obvious striking platforms.

Core hammerstones. Eleven core-like implements, with marks of abrasion on peripheral areas, have seen service as hammerstones (Fig. 19, *o*). Eight are large, 7.5–10.0 cm., and three smaller, 5–7 cm. One of the former was found in the 36-42 inch level of Test II and one of the latter in the 48–54 inch level of the same test.

Chipping hammers. Three small specimens we have called chipping hammers (Fig. 19, *p*). The smallest is 4.2 × 3.8 × 2.7 cm. and the largest, 8.5 × 5.1 × 2.8 cm. in size. They are abraded at their ends and were presumedly used for light percussion flaking.

Large adze-like tools. Tools of this type are usually well made in spite of the apparent crudeness of their percussion flaking (Figs. 16; 18, *k–r;* 19, *x*). Those from the cache (Fig. 16) vary from 18.5 to 25.0 cm. in length, 6.2 to 8.2 cm. in width, and 3.8 to 6.2 cm. in thickness. All are noticeably ridged. The opposite sides of the smaller ones have been chipped approximately striaght across to produce an adze-like form. On larger ones this feature is not so pronounced so that they approach bifaciality. Edges at the sides tend to be sinuous from alternate flaking, but in the better-made specimens this tendency has been held to a minimum. The nicely curved bit is a continuation of the side edges. This bit was formed by removing small chips from both upper and lower surfaces. Opposite ends are irregular and usually pointed. They are unmodified by any retouching. On two of these cached tools there

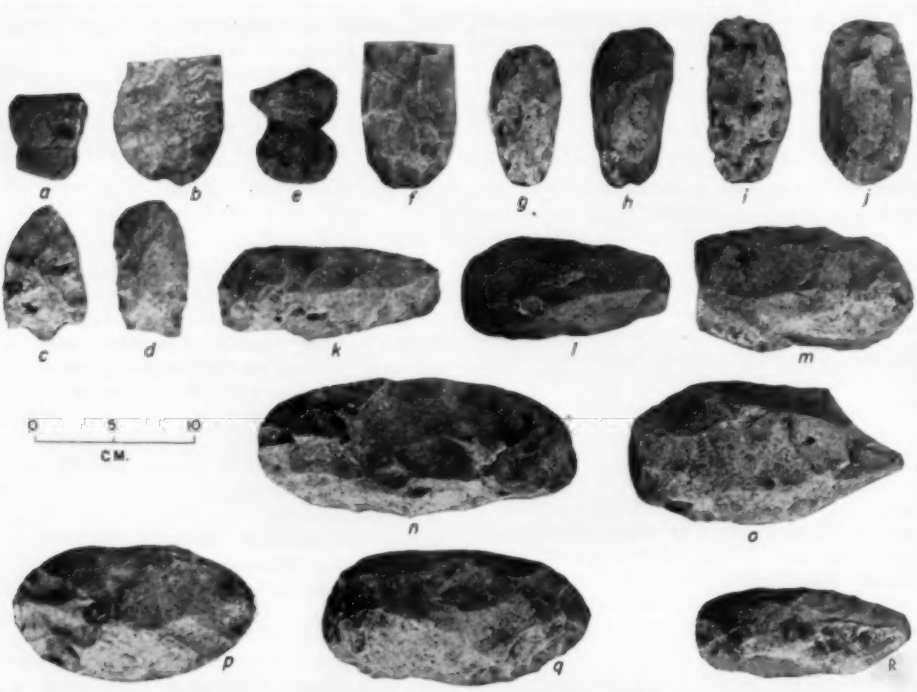

FIG. 18. Stone tools and St. Johns Incised sherd from excavations, Johns Island, Florida. *a*, sherd; *b, f*, blades; *e*, stemmed point; *d, i, j*, small adze-like tools; *e*, notched sinker; *g, h*, rectangular adze-like scrapers; *k–r*, large adze-like tools. *a–d*, from breccia of Test I; *e–r*, from Test II below depth of 38 inches.

is some "decay" of the under side of the bit, possibly from use. Side edges of four show evidence of a little battering. Whether this was caused by use or occurred during manufacture is not certain. On one, the top of the ridge has been pounded, probably in an attempt to reduce its size.

Two similar but relatively shorter and wider tools were found on the beach (Fig. 19, *x*). While waterworn they exhibit a breakdown of the bit indicating these tools to have been used for some purpose which damaged their cutting or scraping ends.

Large adze-like tools from the excavations are illustrated (Fig. 18, *k–r*) and their vertical provenience given in Table 5. These tools are similar to the ones from the cache, described above, but have considerably more range in size and shape. In length they vary from 13.5 to 20.0 cm. They have the same ridged back, sinuous edges, and sharpened bit but are, in general, shorter and wider. Some (Fig. 18, *n*, *p*) appear never to have been used, others to have broken during manufacture. The bit end of one (Fig. 18, *q*) is considerably battered. Another (Fig. 18, *o*) has been used a great deal. Side edges and edges of chipping scars are rounded and the bit battered. The poll end was either hammered or used as a pick.

Small adze-like tools. Five specimens from the beach and six from the excavations are small representations of large adze-like tools. They vary from 7.5 to 11.5 cm. in length. Some show evidence of use (Fig. 18, *d*, *i–j*).

Blanks. Two large (Fig. 19, *v–w*) and seven small specimens are believed to be blanks for adze-like tools. Some of the latter, as well as three smaller ones, may be blanks for rectanguloid adze-like scrapers to be described presently. Both forms were roughed out.

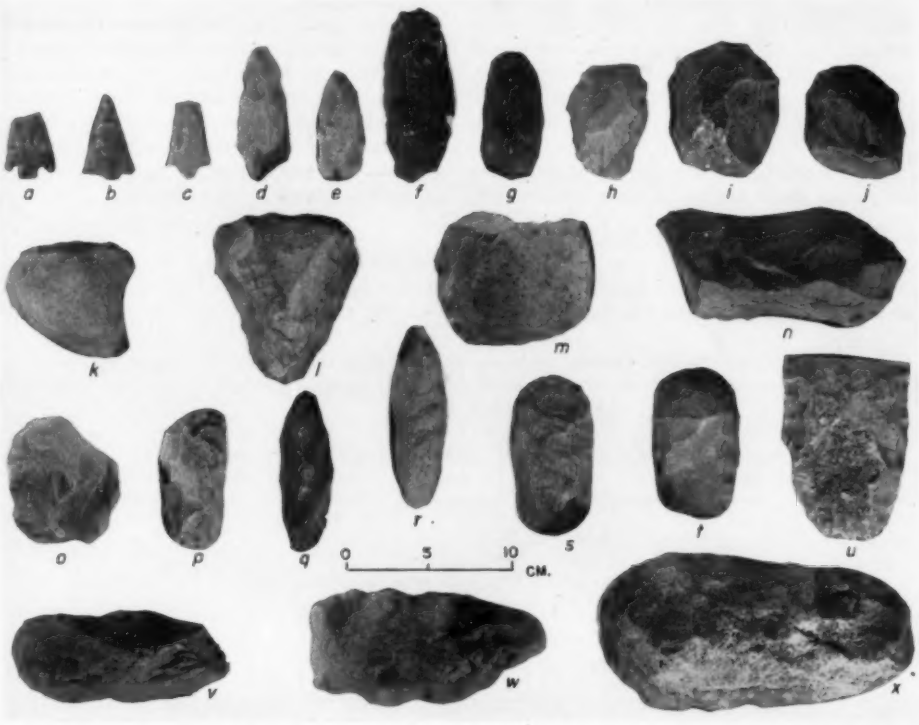

FIG. 19. Stone tools collected from beach at Johns Island, Florida. *a–d*, points; *e–h* flake knives or scrapers; *i*, *j*, disc scrapers; *k–m*, large scrapers; *n*, reworked side scraper; *o*, hammerstone; *p*, chipping hammer; *q*, *r*, picks; *s*, *t*, rectangular adze-like scrapers; *u*, blade; *v*, *w*, blanks; *x*, large adze-like tool.

Rectanguloid adze-like scrapers. Five complete specimens and six fragments have been included in this category (Figs. 18, *g–h;* 19, *s–t*). Bit ends of two show some decay, presumedly from use. On another, evidence of use is present on bit and side edges and the poll is pattered. Two exhibit a slight polish on surfaces near the bit end.[10]

Fragments of adze-like tools. Seven poll ends and eight bit ends of large adze-like tools were found on the beach. These may have broken either during manufacture or use. One of the poll ends is battered and three of the bit ends are rounded or broken by use. Pieces of small adze-like tools were also found.

Several nondescript fragments, presumedly representing similar broken artifacts, were found both on the beach and in the excavations. Except for one in the 6-12 inch level of Test II, such worked fragments were encountered in the excavations only below depths of 18 inches.

Picks. Two double-ended tools have been called picks. One (Fig. 19, *q*) is considerably battered on its edges and points, while the other (Fig. 19, *r*) is only battered on its edges.

Disc scrapers. Edges of two disc-shaped scrapers or knives showed that they had been used a great deal (Fig. 19, *i–j*).

Large scrapers. Three large scrapers, two made from spalls and one from a broken tool, are illustrated (Fig. 19, *k–m*).

Concave side scrapers. Three side scrapers with concave working edges seem to have been been made from tools which broke during manufacture. In the illustration of the largest one (Fig. 19, *n*) the scraping edge is towards the top.

Large stemmed points. One heavy, thick, and relatively broad, percussion flaked point was found near the base of the breccia of Test I (Fig. 18, *c*). Another, of the same length but much narrower, came from the beach (Fig. 19, *d*). It has some breccia adhering to it and may have been used during the early period at Johns Island.

Large blades. Large blades are suggested by two fragments from the beach (Fig. 19, *u*) and three from the excavations (Fig. 18, *b, f*). One was finished by pressure flaking (Fig. 18, *b*).

Knife-scrapers. Five tools fall into this catagory (Fig. 19, *e–h*). One, pressure flaked, has been battered on the butt end (Fig. 19, *g*).

Utilized flakes. Seventeen utilized flakes came from the beach and twelve from the excavations. In the excavations they were limited in distribution to lower zones, except for one in the 6-12 inch level of Test II. These tools are variously shaped flakes from which chips have been removed along one or more edges by or for use. No preference for certain shapes of flakes is indicated in the collection.

Discussion of Tools

Examination of Table 5 indicates that percussion flaked tools were limited in distribution to lower zones. Comparison of this table with

[10] In this respect they resemble adze-like scrapers described for the Archaic by Lewis and Kneberg (1947, p. 21).

TABLE 5. VERTICAL DISTRIBUTION OF ADZES, BLADES, AND POINT

Depth in Inches	*Test I*		*Test I, Extension*			*Test II*		
	Fragments of Adzes	*Stemmed Point*	*Fragments of Adzes*	*Whole Adzes*	*Fragments of Blade*	*Fragments of Adzes*	*Whole Adzes*	*Fragments of Blades*
0–6								
6–12								
12–18								
18–24						1		
24–30			1					
30–36					1*	2		
36–42						5	7	2
42–48	2	1		1			2	
48–54	Limestone		Limestone			1	3	
54–60						Limestone		

* Pressure flaked.

those given earlier for pottery (Tables 1–3) shows the association between these tools and incised and plain sherds made of St. Johns and Pasco pastes.

Perusal of the available literature does not disclose implements comparable to the large adze-like tools found at Johns Island. They are not like those illustrated by Wyman and Moore for the St. Johns River area in east Florida,[11] but they are approached by a few of the "blanks" described by Winchell for Kansas.[12] Some of the tools illustrated by Shippee for the Nebo Hill complex of Western Missouri may be similar.[13]

Among various percussion flaked tools in the collections of the Florida State Museum are a few similar to the large adze-like tools from Johns Island. All came from the Gainesville area except for one from an island about 5 miles south of the mouth of the Suwannee River.[14] Thus all were found within 65 miles to the north and northeast of Johns Island. This limited distribution is suspect as reflecting activities of collectors, but may later prove to have significance.

Smaller percussion flaked tools, large blades, "choppers," "picks," celt-like forms, adze-like scrapers, and large scrapers are sometimes found in late Archaic and early ceramic complexes.[15] These tools may be considered knives and scrapers for use on bone, wood, and hides. Rectangular adze-like scrapers may have been similarly employed or may have been digging tools for the collection of roots and, possibly, for horticulture. The large adze-like tools present a problem. If found in smaller quantities one would be inclined to suggest that they were used in the manufacture of dugout canoes. If hafted as an adze they would have made good tools for the cutting of roots in the clearing of land for cultivation. Whatever their function, the large quantity indicates their importance to the early inhabitants of Johns Island.

PRESSURE CHIPPED STONE TOOLS

Pressure chipped tools were in the minority on the beach and restricted in excavations to upper zones.

Points. From the beach come three stemmed points (Fig. 19, *a–c*) and a flake retouched into a drill. It may be significant that the narrower stemmed point (Fig. 19, *c*) was found in front of the red cottage, where many of the heavy tools were also obtained, while the others were found further to the northeast. Three pressure flaked fragments, presumedly representing points, were also collected. In the past a few narrow, straight-sided triangular points with straight bases have been found on the beach.

Stemmed, trianguloid, and lanceolate shaped points were found in the excavations. The only one from Test II is a crudely made or unfinished isosceles triangular point with concave base (Fig. 20, *y*). It was found between

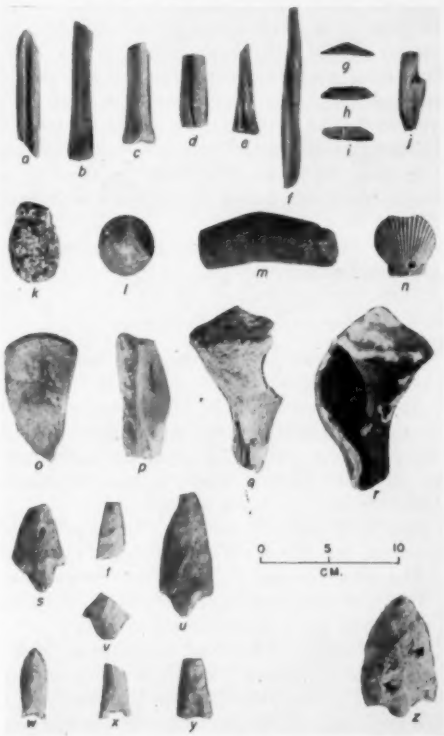

FIG. 20. Miscellaneous artifacts from Johns Island, Florida. *a–c*, bone daggers; *d*, handle of bone tool; *e, f*, bone awls; *g–i*, bone gorges (?); *j*, bone chisel; *k*, limestone plummet; *l*, potter's anvil (?) of limestone; *m*, socketed handle of deer antler; *n*, perforated Pecten shell; *o*, Busycon celt; *p*, columellar hammer; *q*, Busycon pounder; *r*, Busycon pick, Type B; *s–z*, points. *o–r*, from beach, balance from excavations. (*s–a, z*, from Test I; arrangement in illustration follows vertical distribution in midden; *y*, from Test II.)

[11] Wyman, 1875; Moore, 1894.

[12] Winchell, 1913.

[13] Shippee, 1948, Pl. XIV, *C, d; D, g* and *h*.

[14] Catalogue, Florida State Museum, Gainesville, especially cat. nos. 7827 and 9555.

[15] Wedel, 1943, Pls. 13–18.

depths of 36–38 inches and so was just above the concentrations of large stone tools.

From Test I and its extension we have six points and fragments of two others. The large, heavy, percussion flaked, stemmed point found near the base of the breccia has been mentioned earlier (Fig. 20, *z*). Between depths of 24 and 30 inches, at the base of black dirt or in the transition zone between it and the breccia, were two small points (Fig. 20, *w–x*). One is lanceolate with a concave base. The other is triangular with a widely indented base. Judging from chipping scars, the slight downward extension of the middle of the basal indentation was purposely left.

In the 6–12 inch level of this trench was an isosceles triangular point (Fig. 20, *l*). Unfortunately it is incomplete. A small notch is present in the remaining portion of the base. The tip of another small point and two heavy stemmed points also came from this same 6–12 inch level. The latter are percussion flaked and pressure finished. Both have a curved, tapering stem (Fig. 20, *s*, *u*). The basal fragment of a similar point was found in the 18–24 inch level (Fig. 20, *v*).

Large blades. These specimens have been mentioned earlier.

OTHER STONE ARTIFACTS

Stone pendants, plummet type. A crudely made plummet of limestone was found in the 6–12 inch level of Test I (Fig. 20, *k*). This provenience suggests a relatively late or Weeden Island dating for this artifact. This agrees with findings in south Florida where Goggin indicates plummets for his Glades III period.[16]

Several plummets are said to have been found on the beach. We collected a partially pecked lemon-shaped object of limestone, 4 cm. in diameter, and broken at one end. Presumedly, this was intended to be a plummet.

Notched weight. A notched weight or net sinker of coarse sandstone (Fig. 20, *e*) was found in Test II, at a depth of 38 inches and associated with large adze-like tools. This object is notched at all four sides.

Grinding stones. A more or less rectangular piece of limestone, 7.3 cm. in length, from the 12–18 inch level of Test II, exhibits one concave surface and may have been used as a sharpening stone. A small fragment of sandstone from the 36-42 inch level of Test I may be a fragment of a grindstone.

Potter's anvil(?). A unique limestone object may have seen service as a potter's anvil (Fig. 20, *l*). The base is smooth and barely convex. This specimen is shaped like a cone, 2.7 cm. high, with concave sides and a rounded or blunted top. It was found in Test II between depths of 24 and 28 inches.

Utilized flakes. Two utilized flakes, different from others in that one end is battered, were found between depths of 18 and 24 inches, one in each trench.

ARTIFACTS OF BONE

Bone tools are illustrated in Figure 20 and their vertical provenience given in Table 6. It will be noticed that the utilization of bone was more common in earlier than in later zones.

Bone daggers. The most common type of bone tool found at Johns Island we have called "daggers" (Fig. 20, *a–c*). To the seven listed in Table 6 should be added three more fragments found while investigating the cache of large adze-like stone tools. These daggers were associated with such tools and are representative of the earlier occupation of the island.

Bone daggers were made from split cannon bones of deer. All are undecorated. Unfortunately, a complete specimen was not found, so that the usual length is unknown. Articular surfaces at the proximal end are unmodified. The lateral processes at this end have been reduced to nearly the diameter of the shaft and grooved sidewise, a fact which suggests that these tools may have been bound with a thong. Sides of the shaft, where the bone was split, have been rounded by rubbing both longitudinally and laterally. Points have been rounded, are fairly blunt, and do *not* show wear.

In splitting the bone for these tools, it was sawed in a plane about 90° to that which includes the natural groove found in cannon bones. As a result these tools have a groove on both sides. If used as daggers or if hafted as lances, they would produce a wound which would bleed copiously, even if the weapon remained in the wound. Such use would not tend to damage the blunt points but might result in breaks across the shafts such as these tools exhibit.

Head of bone pin. What may be the head of a bone pin was found in the 12–18 inch level of

[16] Goggin, 1947, p. 120.

Test II (Fig. 20, *d*). It differs from handles of bone daggers in that the articular surface has been ground flat and the head reduced to a diameter smaller than that of the shaft. This specimen also has a lateral groove cut all the way to the top.

Fragments of bone pins. None of these are typologically classifiable. Some may be fragments of awls or other tools.

Bone awls. Two bone awls have been listed. One is a splinter awl (Fig. 20, *f*). The other, with a beveled point, had the deeper provenience of the two (Fig. 20, *e*).

Gorges. Three double-ended tools have been listed as possible gorges (Fig. 20, *g–i*). The one from Test I is triangular in shape, flat, and fairly thin. It is similar to one illustrated by Moore for a Weeden Island-Fort Walton period mound near the Apalachicola River.[17] The two from Test II are thicker and differently shaped.

Bone chisel. A fragmentary specimen from the 30–36 inch level of Test I has a chisel-like end (Fig. 20, *j*).

Deer antler. Eight fragments of deer antler were found in the 36–42 inch levels. Three have been hollowed out at one end as if for use as handles. In the best example sides have been smoothed and the other end battered (Fig. 20, *m*).

ARTIFACTS OF SHELL

Shell artifacts include a blank(?) for a Busycon celt from the 6–12 inch level of Test I and from Test II a fragment of a Fasciolaria pick from the 6–12 inch level, a fragment of a Busycon pick and a Busycon pounder from the 30–36 inch level, a worked Busycon shell and two ends(?) of Busycon hammers from the 42–48 inch level, and several perforated Pecten shells (Fig. 20, *n*) from the 36–60 inch zone.

From the beach were collected a Busycon celt, a columellar hammer, a Busycon pounder, a Type B Busycon pick (Fig. 20, *o–r*, respectively), and three broken ends of Busycon hammers.

DISCUSSION AND CONCLUSIONS

This work was undertaken to determine the cultural associations of the large stone tools found at Johns Island and to investigate the possibility of there having been a rise in sea level since the site was first occupied. It has been demonstrated that such tools were made and used during a ceramic horizon characterized by Pasco and St. Johns Incised pottery. The following discussion is divided into two parts: first, a discussion of dating, including the rise in sea level; and second, a discussion of the culture sequence at the island.

Table 6. Vertical Distribution of Fragments of Bone Tools

Depths in Inches	*Test I*				*Test II*				
	Daggers	*Pins (?)*	*Gorge*	*Worked Bone*	*Daggers*	*Pins (?)*	*Gorges*	*Awls*	*Worked Bone*
0–6	1	1							
6–12									
12–18									
18–24			1					1	
24–30	1	1		1		1			2
30–36	1			1	1	2	1		
36–42		2				1			
42–48						1			2
48–54	Limestone				2	2	1	1	2
54–60					1				1
					Limestone				

DATING OF JOHNS ISLAND

Elevations taken at Johns Island were referred to a United States Coast and Geodetic Survey triangulation marker installed on the island. Data indicate that the top of the limestone, upon which cultural debris was lying,

[17] Moore, 1903, p. 447.

is from 3.35 to 4.10 feet below the marker in Test I and from 4.14 to 4.48 feet below the marker in Test II. At *E* (Fig. 13), top of the limestone was 4.18 feet below the marker. These values indicate a relatively level top of the limestone with an average elevation of about 4 feet below the marker.

Readings were taken at apparent low and high tides while we were at the island. As we did not have proper equipment for the taking of tidal elevations, nor a sufficiently long series, our values may only be taken as approximations. Our readings indicate low tide at 5.4 and high tide at 2.52 feet below the marker. This gives an apparent mean tide of 3.96 feet below the marker or about the same as the elevation of the top of the limestone.

That this situation is approximately correct is shown by the fact that the outcrop of limestone on the beach is covered by water at about mid-tide. Snail-shell breccia containing food bones is still cemented to this limestone outcrop.

These data show that the top of the limestone would be covered by water twice a day to a depth of about 1.5 feet if it were not protected by the midden. It is inconceivable that the site could have been occupied and the midden started under today's conditions.

This implies a rise in sea level relative to the land of at least 1.5 feet, probably considerably more, since the site was first occupied. Taking into consideration the necessity for a dry area for living purposes and the successful utilization of fire, we estimate that a sea level at least 2 feet lower than today would be required to made the surface of the limestone at Johns Island habitable. This estimate would appear to be conservative. As a rough check on this estimate we have the evidence from the marsh behind Johns Island where artifacts were found from 20 inches to 3 feet below the present surface.

Mr. J. H. Hamley, acting director of the U. S. Coast and Geodetic Survey, has kindly given us some data on the recent rise in sea level for the Gulf Coast of Florida. We quote from his letter of July 1, 1949.

> Primary tide stations where long-period records are available are located at Key West, Cedar Keys, and Pensacola. At Key West the records indicate little change in sea level from 1913 to 1930 after which the rise is at the rate of a little less than 0.02 foot per year. At Cedar Keys [less than 45 miles from Johns Island] there was a break in the observations from 1926 to 1938. However there are indications of little change in sea level from 1915 to 1930 and since 1939 the rise has been at the rate of about 0.02 foot per year. At Pensacola sea level has risen more or less steadily since 1924 at a rate of a little less than 0.02 foot per year.

These records indicate a variable rate of rise. Apparently, there was very little change over about 15 years and then for the last 10 to 15 years a rise of slightly less than 0.02 feet per year. While we have no right to assume such rates to have been similar in the past, it may be of interest to see what the result would be if projected back in time. Averaging the rate of rise in sea level at 0.01 foot per year gives only 200 years for a rise of 2 feet. The last Indian remains at the island are more than 200 years old. If the rate of rise of sea level in the past was at all like that of today, Johns Island was well above sea level when first occupied.

We asked Dr. John H. Davis, Professor of Biology at the University of Florida, who ran tests on the rate of growth of peat in the Everglades, to estimate the time required to grow the deposit of peat which covered the artifacts found in the marsh behind Johns Island. The longest time he would allow, after visiting the site and testing the marsh, was about 500 years. This estimate is also insufficient for the first occupancy of the island.

However, if it may be assumed that the top artifacts in the marsh represent the time of abandonment of the island by people of the Weeden Island culture (a questionable assumption, although one Swift Creek Complicated Stamped sherd was found in Test F in the marsh), we would have a date of about 1450 A.D. for this abandonment. While this correlation is extremely tenuous, it is of interest to note that it is the same date as that most recently offered by Goggin for the end of Weeden Island and the beginning of the Ft. Walton-Safety Harbor periods.[18]

Rouse has recently reviewed the geological literature of Florida.[19] He finds no evidence for any appreciable change in the elevation of the land of the east coast of Florida since Anastasia times, or the later part of the third (Sangamon) interglacial period. He mentions, however, that Richards suggests that the west coast of Florida has been depressed as a result of the vast amount of debris deposited by the Mississippi River. The drowned appearance of

[18] Goggin, 1949.

[19] Rouse, n.d.

the coast around Chassahowitzka Bay and the apparently greater rise in sea level at Pensacola than at Cedar Keys would lend support to Richards' theory. Apparently the geological situations on the east and west coasts of Florida are different and Rouse's geological correlations for the east coast are not applicable to the west coast. It thus follows, pending more geological study, that the only way to date the early occupation at Johns Island is the archaeological one of comparative typology.

Pasco Incised and St. Johns Incised were found in the lower zones at Johns Island. The latter type occurs in east Florida, where it is believed to have been made just after Orange, or fiber-tempered times, i.e., in the first part of the Malabar I period.[20] To date the only stratigraphic evidence is that offered by Mr. A. T. Anderson for South Indian Field near Melbourne.[21] Our findings would tend to support Anderson's contention that such pottery was used at South Indian Field during a distinct post-Orange period.

Rouse, in his study of South Indian Field and the surrounding area, suggests a date of about 0 B.C. for the end of the Orange period, during which fiber-tempered pottery was made. This date is based on geological correlation.[22] The succeeding period, when chalky pottery was made and decorated with incised designs like those used on fiber-tempered pottery (St. Johns Incised), should follow immediately thereafter and be dated as about 100 A.D. The first occupation at Johns Island, when St. Johns Incised and Pasco Incised were the important types, should, following this argument, have occurred at a comparable time.

CULTURE SEQUENCE AT JOHNS ISLAND

It has been shown that the deposits at Johns Island may be divided into three superimposed zones. Approximately correlating with these stratigraphic zones are cultural manifestations which, from early to late, are herein designated as Johns Island I, Johns Island II, and Weeden Island and Safety Harbor.

Johns Island I. This period is represented by artifacts found in the snail shell breccia of Test I and the lower concentration of oyster shells which occupied the lowest 18–24 inches of Test II. It is characterized by heavy, percussion flaked, adze-like stone tools, smaller percussion flaked stone tools, bone daggers, perforated Pecten shells, other bone and shell tools, Pasco Incised, Pasco Plain, St. Johns Incised, and St. Johns Plain pottery. Strickland Scored is a minor pottery type. Hernando Check Stamped and Pasco Interior Slipped, more prominent in later times, seem to have originated in the Johns Island I period. Heavy stemmed points may also have been in use at this time.

It seems almost certain that vessels of the Pasco series were locally manufactured. Those of the St. Johns series presumably represent influences from the St. Johns drainage to the east.

Temporally, this period should immediately follow the close of fiber-tempered times, judging from the situation in east Florida. That this is probably the correct assumption is suggested by the inclusion of fibrous material in a few of the chalky sherds from the breccia of Test I. In only one case, a sherd of St. Johns Incised, is this pronounced. On this sherd, fiber-tempering is clearly suggested by the condition of the inner surface (Figs. 17, *cc;* 18, *a*).

This fact (the presence of some fiber-tempering), together with the relatively small quantity of sherds in the breccia, suggests the possibility that the lowest zones of Test I may be somewhat older than those of Test II. A trench between these tests would disclose the relationship between the deposits, but at present it cannot be dug because the intervening space is occupied by a cottage.

We have very little information regarding life at Johns Island during this early period. Presumedly the site was chosen because of its proximity to beds of shellfish, which formed an important part of the food supply. Animal, fish, bird, and turtle resources of the area were also exploited.

The perforated Pecten shells may represent ornaments, as they seem too light in weight to have functioned as sinkers for fishing. The bone daggers seem too heavy to have been hair ornaments, and a more mundane function may be presumed. Duplicate specimens have not, apparently, been reported from other sites. The smaller percussion flaked tools would have been useful for chopping, cutting, and scraping. The large adze-like tools present an enigma. That the inhabitants had a need for

[20] Goggin, 1947, p. 122; 1949.

[21] Rouse, n.d. Rouse tentatively distinguishes Malabar I and Malabar I′ periods, the former having St. Johns Incised pottery and the latter lacking it.

[22] *Ibid.*

heavy tools is evident, but why?

Johns Island II. Artifacts from the intermediate zones of black dirt, which contained some shells, are considered as representing a Johns Island II period. This period is marked by the introduction of various new pottery types but local wares, Pasco Plain and Pasco Interior Slipped, dominate. The manufacture of heavy stone tools and of Pasco and St. Johns Incised vessels ends. Points are small and well chipped.

New pottery types appear and disappear in a bewildering array. Such types include Thomas Simple Stamped, Matecumbe Incised, Crooked River Complicated Stamped, and sherds of micaceous paste with zoned punctate decoration. At shallower depths we have Deptford Cross-Simple Stamped, Strickland Overstamped, and St. Johns Simple Stamped. Hernando Check Stamped, Carrabelle Punctated, and Carrabelle Incised seem to continue into the succeeding period.

Judging from the pottery, this period marks a time when a continuing bombardment of influences from the north disrupted or displaced influences from the St. Johns River drainage, although the indigenous Pasco wares were unaffected. Probably with these influences came a greater utilization of pressure flaking. Bone, shell, and stone tools were not as important as previously.

Apparently, the Johns Island II period was one during which the site was periodically occupied by the same group of Indians over a very long time. During this time their customary containers were made of Pasco paste. "Trade" vessels they secured elsewhere. This periodic occupation appears to be in contrast with that of the earlier period, when a more permanent habitation seems indicated.

Weeden Island. The upper 12 inches of both tests produced pottery similar to that of the Weeden Island period of the Florida Gulf Coast. Wakulla Check Stamped and Swift Creek Complicated Stamped (late variety) are the dominant types. Substantial amounts of Pasco Plain show continuity with previous periods. Some points are fairly large and have curved stems. They seem too heavy for use with the bow and arrow and, unless they are knives, suggest the use of the atlatl. The only stratigraphically located plummet is from this period.

Again we know very little about the life of the people. A greater abundance of oyster shell is suggested by the deposits. Otherwise our data are too fragmentary for any reconstruction.

Safety Harbor. It is probably incorrect to speak of a Safety Harbor "period" at Johns Island on the basis of the present data. However, Pinallas Plain and shell-tempered pottery, found in the top 6 inches of the midden, and narrow, straight-sided triangular points, found in prior years on the beach, are typical of that time period. Presence of this period on Crystal River, 13 miles to the north, was demonstrated by Rainey's work at Buzzard's Island.[23]

In conclusion it may be pointed out that there is no reason to consider Johns Island archaeologically different from the rest of the surrounding area. Pottery in the Florida Park Service's collections from Homosassa, Crystal River, and Cedar Keys (6, 13, and 40 miles, respectively, north of Johns Island) include Pasco Plain. Sherds of Weeden Island types from middens (not burial mound specimens) include limestone tempering and are similar to Weeden Island types found at Johns Island. People who lived at the island were not isolated, but participated in the cultural changes of the area.

Data from Johns Island show the existence of an early limestone-tempered ceramic period which postdates a postulated fiber-tempered period in this area and antedates Deptford influences from the north. Connections with the St. Johns drainage to the east are evident. This early period appears to be contemporaneous with part of Perico Island to the south of Tampa Bay, where limestone-tempered, some fiber-tempered, and a few sherds of St. Johns Incised were found.[24]

The intermediate period at Johns Island should be the local equivalent of the late Perico Island period to the south and Deptford and Santa Rosa-Swift Creek periods to the north. It probably covers a long time span and may later be subdivided. Swift Creek influences appear to be rather slight, as no Swift Creek Complicated Stamped (Early Variety) was found.

Relationships between Johns Island and the famous Crystal River site, 13 miles to the north, are obscure. However, they can be worked out when stratigraphic data are available from Crystal River. Judging from Moore's illustra-

[23] Rainey, 1935.

[24] Willey, personal communication.

tions,[25] the Crystal River site covers the Safety Harbor, Weeden Island, and part of the intermediate Johns Island periods.

Additional work in the area should be very rewarding in our understanding of these relationships and the prehistory of the Florida Central Gulf Coast.

[25] Moore, 1903, p. 385.

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Florida Park Service
Gainesville, Florida
August, 1949

AN EARLY LITHIC COMPLEX FROM CENTRAL FLORIDA

JOHN M. GOGGIN

DURING the academic year 1948–49 an archaeological survey of the central Florida region was initiated by the writer and carried out with the aid of University of Florida students.[1] As a result a large number of sites have been located, many of which have no pottery on the surface but are characterized by an abundance of flint chips and chipped stone artifacts. Most of the stone points are not distinctive although a few, known as Suwannee points, are suggestive of fluted points and Plainview forms found elsewhere.[2] With a hope of determining the cultural position of this type of point, and of defining possible lithic complexes in the region, a program of test excavations was planned. These have resulted in the recognition of a new lithic entity, the Santa Fe complex.

Work was carried out in the summer of 1949 by a group of students comprising the Summer Archaeological Field Session of the University of Florida.[3] Two tests were made, at the Suwannee site (Su 2) northwest of Gainesville on the Suwannee River, and at the Whitehurst site (A 35) just south of Gainesville. At the former site excavations were made only during two days, while four weeks were spent at the Whitehurst site.

The Whitehurst site (A 35) is located on the south side of Paynes Prairie, a large intermittently flooded marsh which has been alternately a lake or a marsh. The site is situated directly on the edge of the priairie, where the ground rises some 15 feet in a fairly steep slope. Here, abundant flint artifacts and chips are found in an area several hundred yards in extent, parallel to the prairie and extending back some 200 feet or so from the prairie edge.

The area was laid out in a 5-foot grid system and a primary row of squares was excavated from near the top of the slope down and well out into the open prairie. It was found that only a thin layer of cultural material covered the basal clay on the upper part of the slope. This is a remnant of a once deeper deposit denuded by slope wash when the soil was loosened by cultivation. Because of this, most of our work was concentrated in several rows of squares at the base of the slope and parallel to the prairie.

Here cultural material was found in a sand matrix resting unconformably on a clay hardpan. The deposit was of brownish sand appreciably stained in contrast to greyer material above. Refuse consisted almost entirely of numerous flint chips; for example, one unusual square 4 inches deep contained over a thousand, a few artifacts, but no animal bones or shell. The artifacts found include flint points, numerous blades, and retouched flakes. A few sherds were found *in situ*. They comprise a single New River Complicated Stamped sherd, several Franklin Plain, and several unclassified plain gritty ware sherds.[4] The analysis of the site is complicated by the fact that slope wash has deposited material of this complex as well as some later sherds and modern material in a thick layer at the base of the slope above the original deposit. The separation and study of these deposits will take some time. For that reason a more detailed discussion of the site will be omitted here. However, the lithic complex is closely similar to that from the next site.

The Suwannee site (Su 2) is situated on the point within the junction of the Santa Fe and Suwannee rivers. Except where floods have scoured material away there is little surface evidence of human occupation. A single trench (Trench 1) 50 feet long, 5 feet wide, comprising nine squares, was excavated down to clay hardpan in 4-inch levels, reaching bottom at depths varying from 16 to 48 inches. A thin layer of hard clay on the surface is undoubtedly flood deposited. The remainder of the site above the hardpan is sand, usually tan in color, but variously mottled in brown and red, apparently from localized concentration of iron oxides.

Throughout this sand matrix are scattered a

[1] This research program of the Department of Sociology and Anthropology, University of Florida, is supported by a grant from the Viking Fund, Inc. Grateful thanks are given to the landowners who permitted excavation: Charles Whitehurst for the Whitehurst site and O. O. Vrooman, Cleveland, Ohio, for the Suwannee site.

[2] Simpson (1948) discusses their range in Florida.

[3] They included Virginia Clyde, Shirley Cumming, Katherine H. Cutler, Harvey M. Eisgrou, Wilmot D. Green, Donald Kokomoor, Edward H. Michelson, George Pitzke III, and Lois Watkins.

[4] These types are described and discussed in Willey, 1949, pp. 386, 392.

sprinkling of artifacts and flint chips. These last, however, are not as common as at the Whitehurst site. Potsherds in the trench include several plain, cord-marked, and simple stamped forms of the Deptford Series and a new form of fiber-tempered pottery, Suwannee Plain. Sherds, though, are very rare, only ten in all, and less in quantity than chipped stone tools.

Stone tools fall into three categories: (1) biface tools—specimens probably made from flakes but completely modified by secondary chipping to such an extent that little of the original surface remains (Fig. 21, *R–U*); (2) uniface tools—in which one face of the flake remains relatively unmodified while the other face and edges have been considerably altered by secondary chipping (Fig. 21, *J* and *L*); and (3) worked flakes—flakes unmodified except for fine retouching on a section of the edge (Fig. 21, *A–C*, *F–H*).

The first category of biface tools includes only points: in all, four complete points, two stemmed basal portions of points, one central section of a point or blade, and one tip of a point or blade. These points and fragments represent no distinctive types. With one exception they are medium to large, triangular, stemmed forms with varying shoulders. Two are asymmetrical with a pronounced barb on one shoulder (Fig. 21, *T*), two are slightly barbed (Fig. 21, *U*), while one has rather pronounced square shoulders and square based stem (Fig. 21, *S*). The exception is a triangular point, with slightly notched corners, pronounced "ears," and a concave base (Fig. 21, *R*).

Uniface tools, the second category, are represented by five specimens. One, in fragmentary condition, appears more like a blade than a scraper; but the other four have pronounced beveled edges, are triangular to ovoid in outline, have a flat under surface represented by a single flake cleavage, and exhibit extensive retouching, with few exceptions only on the upper surface (Fig. 21, *J* and *L*).

Worked flakes have been grouped in a third category. These are irregular in form and thickness, while the edges exhibit varying amounts of retouching, usually on one surface only. Sometimes the flake is long, narrow, and well-formed (Fig. 21, *C* and *F*); others are irregular crude examples (Fig. 21, *G*). The retouching may run the full length of a straight edge or be executed on a curved edge of the flake, producing a curved notched edge. In some instances the retouching is so thorough as to produce a steep scraper edge. Small microlithic-like retouched flakes are also found (Fig. 21, *H*).

A smaller collection of worked flint comes from Tests I and II, made previous to the Field School excavation. It is similar in all respects to the larger collection but includes only uniface tools and worked flakes. Without exception both the worked and unworked flint from all the excavations has sharp edges and surfaces exhibiting no wear. Some patination is found in varying degrees on most specimens.

The pottery from the excavations comprises two categories, the grit-tempered ware and fiber-tempered. The former paste is unlike any other in Florida. It contains an abundance of gritty particles ranging from large to small in size, including clear and rose quartz and iron oxide inclusions. The simple-stamped and cord-marked forms can be included in the Deptford Simple Stamped and Deptford Cord Marked types. Suwannee Plain, the fiber-tempered ware, is undecorated but similar in all paste details, except for numerous large vesicles and cavities left when the copious, included fiber was burnt out in firing. A much larger series of sherds from Test 1, found near the surface, complements the sample from Trench 1. It is similar but includes another type, Deptford Linear Check Stamped (?).

The distribution of various flint forms and their relation to pottery within the site has not been worked out in detail, and since the trench cut across a sloping surface the final analysis will take considerable care. However, the following observations can tentatively be offered: (1) Flint types of all three categories are distributed vertically and horizontally throughout the site. (2) The variant point form with an "eared" base is located midway down the deposit and thus falls in neither the top nor the bottom. (3) Potsherds are found at varying depths in the site; but, whenever found, are always in the top half of that particular trench-square. When final analysis and interpretation of the site is made it is believed that the pottery can be demonstrated to be present only in the upper half of the site.

Turning back to the Whitehurst site, it is thought that the picture there will eventually prove to be similar to that at the Suwanee site. Flint categories are identical and pottery in the broadest consideration is similar. In details, though, the ceramic types apparently represent different expressions of the same broad

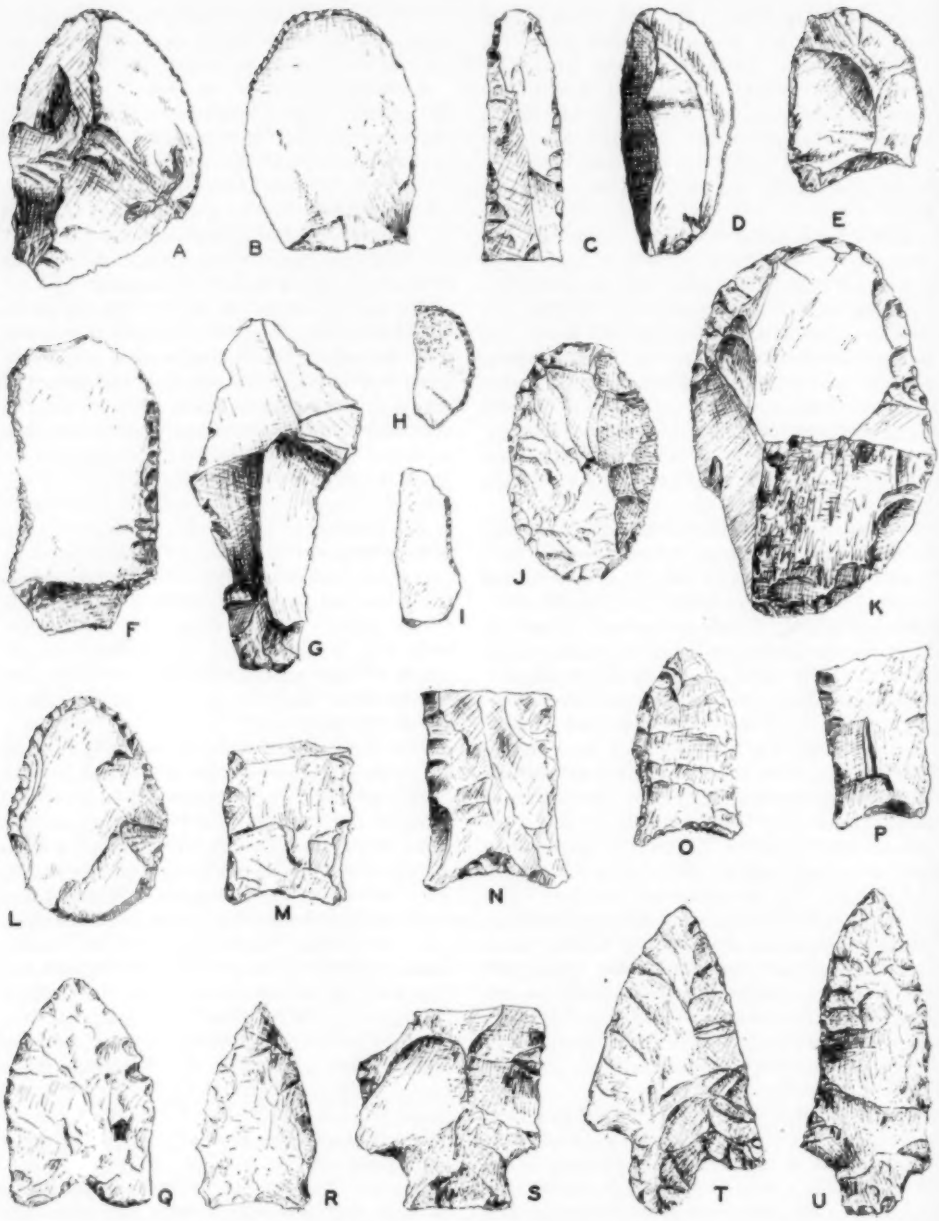

FIG. 21. Santa Fe Complex artifacts and Suwannee points. *A–I*, worked flakes; *J–L*, uniface tools; *M–P*, Suwannee points; *Q*, unclassified point; *R–U*, biface tools. Scale 2/3. *A*, Su 2, Sec. 1, 20″–24″; *B*, Su 2, Sec. 6, 12″–16″; *C*, Su 2, Sec. 7, 0″–4″; *D*, A 35, Q′49, 24″–30″; *E*, A 35, P′57, 12″–18; *F*, Su 2, Sec. 4, 16″–20″; *G*, Su 2, Sec. 3, 12″–16″; *H*, Su 2, Sec. 2, 4″–8″; *I*, A 35, I′49, 12″–18″; *J*, Su 2, Sec. 1, 24″–28″; *K*, A 35, Q′56, 18″–24′; *L*, Su 2, Sec. 5, 0″–4″; *M–Q*, A 36, surface; *R*, Su 2, Sec. 2, 16″–20″; *S*, Su 2, Sec. 3, 0″–4″; *T*, Su 2, Sec. 6, 16″–20″; *U*, Su 2, 5, 8″–12″. (All Su 2 specimens are from Trench 1.)

ceramic tradition. Both sites also have a numerically greater number of flint artifacts than potsherds, an absolutely unique phenomenon in Florida.

Careful dating of the sites or placing divisions of the sites into cultural categories is not easy, but certain general statements can be made. On the whole, all the material excavated falls within the Florida Archaic tradition, which includes preceramic and early pottery complexes.[5]

In Central Florida the Archaic tradition is represented by the Preceramic and Orange periods and part or all (?) of the Pre-Cades Pond period. It is assumed that our non-ceramic material falls into the first of these periods, our fiber-tempered pottery in the Orange period, and our Deptford pottery in the initial part of the Pre-Cades Pond period.[6]

The general relationship of the distinctive flint material within the sites is not clear. However, it appears to the writer than in the Santa Fe complex we are dealing with a group of lithic types of pre-pottery times which extended into early pottery-using times. The earliest appearance of this complex cannot be estimated. The geology of the sites unfortunately does not appear to offer any clues to their dates.

It is to be noted that Suwannee points, of the type which has some resemblances to Paleo-Indian forms, were not found in our limited excavations. Examples were collected, however, from the surface of a cultivated field (A 36) adjacent to the Whitehurst site, where the lithic materials are preponderantly those of the Santa Fe complex (Fig. 21, *M-P*). Were the Suwannee points later than the Santa Fe complex, were they contemporary rare components of this complex, or were they earlier? All three interpretations are possible but the first is the least probable in view of our knowledge of the later periods. A decision between the other two cannot be made at the present time.

In summary, we can note the existence of a new lithic complex, the Santa Fe, found to date only in north central Florida. It is of the Archaic tradition, dating in part from the Preceramic period but apparently extending into the later Orange and perhaps early Pre-Cades Pond periods. The relation of Suwannee points to this complex cannot be determined as yet.

[5] Goggin, 1949, pp. 21–4.

[6] It is not improbable that in western parts of Florida fiber-tempered and grit-tempered wares were in part coeval. They sometimes occur together as here, and are similarily found in Georgia and Alabama.

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University of Florida
Gainesville, Florida
September, 1949

THE POTTERY OF THE SOUTHERN PAIUTE

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ALTHOUGH southwestern archaeologists have for years been greatly interested in the classification and description of pottery, their investigations have been primarily centered on the pottery of the Pueblos and other sedentary groups, and comparatively little attention was given to the ceramics of the nomadic or semi-nomadic southwestern groups. Within recent years some studies have been made on Navaho and Western Apache pottery, but as yet there have been no detailed studies of the pottery of such peripheral nomadic or semi-nomadic tribes as the Ute and Southern Paiute. Therefore, it seems well worthwhile at this time to present the following brief notes concerning the results of several years of archaeological field work in the Southern Paiute area.

The Southern Paiute area to which I am referrring centers about the Moapa and Virgin river valleys in southeastern Nevada and includes only areas occupied by Southern Paiute groups or bands with which I have had first-hand acquaintance or from whose regions specimens have been secured. This discussion, therefore, pertains primarily to the following bands: the Moapa, Las Vegas, and Shivwits, and, in addition a limited section of the Pahrump or Ash Meadows group, the St. George, and the northern fringe of the Chemehuevi.[1] However, this comprises fully half or more of the total Southern Paiute area in Nevada, Utah, and California, and includes the larger and more sedentary of the Southern Paiute bands.

For the most part southwestern ethnologists and archaeologists have thought of the Southern Paiute as largely, if not entirely, lacking the art of pottery making. This belief was based chiefly on the reports of early western explorers and on the studies of later ethnologists, who visited this culture long after the art had practically disappeared. As has so often been the case, once a group became acquainted with the white man's iron tools and other utensils, pottery manufacture rapidly declined and frequently soon became virtually nonexistent. This seems to have been particularly true with respect to many of the groups of the Southern Paiute. These Indians, through their location on the Old Spanish Trail from Santa Fe to the San Gabriel Mission in California, came in contact with Spanish traders and travellers at least as early as the opening of the nineteenth century and shortly thereafter with American trappers and explorers.[2] Consequently, it is not surprising that references to the Southern Paiute after the middle of the nineteenth century make little or no mention of pottery. The following brief summary of the major recorded white contacts is presented here to indicate the paucity of reference during this period to Southern Paiute pottery making.

Our earliest reference of direct contact with the Indians of this area, that of Escalante in 1776, notes the practise of agriculture, with ditch irrigation, in the Virgin Valley but says nothing about pottery.[3] Fifty years later Smith[4] and Pattie[5] passed through the Southern Paiute area and again mention is made of agriculture but not of pottery. On the other hand Smith, for example, also speaks of Mohave agriculture but does not indicate pottery making, which was a well developed art among this group. Thus it seems that not too much reliance should be placed upon such bits of negative evidence.

However, in 1844 Fremont traversed the Southern Paiute area and writes of seeing "large earthen vessels on the fire."[6] Although this incident occurred some distance southwest of the Las Vegas, Nevada area, it is probable that the Indians encountered were Southern Paiute. Fremont later indicates this when he describes the Indians of the Moapa Valley as being the same as those met several days previously by the above-mentioned fire.[7]

* Published by permission of the Director, National Park Service.

[1] Lowie, 1924, p. 193; Kelly, 1934, p. 552; Steward, 1937*b*, Fig. 1; Steward, 1938, pp. 180–5; Stewart, 1942, p. 237; Powell and Ingalls, 1874, pp. 10–11; Kroeber, 1939, p. 52.

[2] Bancroft, 1890, pp. 36–9.

[3] Auerbach, 1943, pp. 85–91. However, this is not too surprising, since Escalante's party contacted only the northern and eastern groups of the Southern Paiute. Yet he does remark upon the occurrence of basketry.

[4] Dale, 1941, p. 184.

[5] Pattie, 1905, pp. 137–9.

[6] Fremont, 1845, p. 263.

[7] *Ibid.*, p. 267.

After the middle of the century a number of Government explorers and surveyors, including Lt. Ives[8] in 1858 and Lt. Wheeler[9] in 1871, touched the edge of Southern Paiute territory along the Colorado River, and as would be expected in this area, make no mention of pottery. Hiller's photographs of the Southern Paiute, taken in 1873, also show no specimens of pottery.[10] In 1875 Loew tells of finding a little agriculture among the Southern Paiute but no reference is made to pottery.[11] Nevertheless, Palmer in 1875 and 1877, although not specifically mentioning pottery in his brief notes, still was able to collect three complete pottery vessels from the Southern Paiute, indicating that pottery was still in use at that relatively late date.[12]

Later ethnologists could find almost no examples of pottery and could discover but little information concerning vessel shapes and methods of manufacture. There is no mention of pottery making in the brief discussion of the Paiute Indians in the "Handbook of the American Indians."[13] The first and almost the only scientific ethnological study of Southern Paiute material culture, made by Lowie in 1914 and 1915, concludes that the Southern Paiute had previously made pottery, but the inference is that it constituted a very minor element in their culture.[14] Stewart, from field studies made in 1937–38 on four Southern Paiute bands, credits only the Shivwits groups with a little pottery.[15] However, the other three bands studied by him were the small northeastern groups, and the larger and perhaps more typical Moapa, St. George, and Las Vegas bands were not listed at all. In 1938 Wissler ascribed a little pottery to the Southern Ute but made no reference to Southern Paiute pottery.[16] Steward in 1940 stated that pottery was known to the Southern Paiute but was not of great importance.[17]

In 1936 Douglas, in compiling a resume of Ute and Paiute pottery, could make only the following brief comments:

> Because of lack of investigations little can be said about their pottery except that rather crude cooking pots with conical bottoms were made. They were brownish-black and undecorated.[18]

From these accounts it is evident that, upon the basis solely of a survey of the records of early traders and explorers and of the studies of later ethnologists, one would surmise that the Southern Paiute formerly made a very few plain cooking vessels of clay, but would assume that pottery making played only an extremely minor role in their culture.

However, as early as 1926 an archaeologist, M. R. Harrington, had published a brief account of Southern Paiute pottery recovered from campsites in the Moapa or Muddy River Valley of southeastern Nevada:

> Sometimes seen on the surface of pueblo sites, but usually on campsites showing no trace of dwellings of any kind, is still another sort of pottery—dark brown or black in color, coarse, granular, and rather soft in texture, and irregular as to thickness and surface. When decorated at all it bears merely lines of fingernail impressions, and many of the vessels seem to have been conical in form, with pointed bottoms—very different from most Pueblo ware. This pottery we have been able to identify as of Paiute origin, and we learned from the Indians that such vessels were manufactured by the Moapa band as late as 1890.[19]

Although quite brief, this account is yet more concrete and detailed than any previous description I have been able to find. A year later Harrington published a similar description,[20] and again in 1930[21] and in 1937.[22]

Thus, although as early as 1926 there was a published description of Southern Paiute pottery, with very few exceptions there seems to have been little attention paid to it.

Early in 1942, after more than a year of archaeological field work in southeastern Nevada, I published a brief note on Southern Paiute pottery,[23] and, later the same year, the following more detailed account, based

[8] Ives, 1861, p. 100.

[9] Wheeler, 1889, p. 162.

[10] Steward, 1939, p. 9. Again this is not unexpected, however, since most of the photographs illustrating cultural materials were taken among the Kaibab band where one would least expect to find pottery.

[11] Loew, 1876, p. 323.

[12] Palmer, 1878, pp. 601–3; also letter of May 2, 1949 from Dr. J. O. Brew, Peabody Museum. A fourth vessel in the Peabody Museum was purchased in 1908 from an Indian by a Mr. Hartman.

[13] Hodge, 1910, pp. 186–8.

[14] Lowie, 1924, pp. 25–6.

[15] Stewart, 1942, p. 273.

[16] Wissler, 1938, p. 243.

[17] Steward, 1940, p. 484.

[18] Douglas, 1935, p. 79.

[19] Harrington, 1926, p. 71.

[20] Harrington, 1927, p. 271.

[21] Harrington, 1930, p. 24.

[22] Harrington, 1937, pp. 24–5.

[23] Baldwin, 1942*a*, p. 16.

partly on Harrington's accounts and partly on my own field work was issued:

> Contrary to popular opinion the Paiute formerly made a great deal of pottery. Sherds are as common on most Paiute campsites as they are on many of the neighboring Pueblo ruins. The pottery is relatively coarse in texture, thick-walled, dark brown to black in color, and rather heavily tempered with sand. Minute flakes of mica are generally conspicuous on the surface. Exterior surfaces commonly are quite rough, often showing small fingernail indentations. Vessel shapes are characterized by thick pointed bases, wide mouths with slightly outcurving rims, and medium to tall globular bodies. Paiute pottery thus falls within the general Woodland type, closely related to Ute, Navaho, and Western Apache utility wares.[24]

During the following six years sporadic archaeological survey and excavation were conducted by the National Park Service in southeastern Nevada and northwestern Arizona, largely within the region now included in the Lake Mead National Recreational Area.[25] It is believed that a sufficient amount of material has now been gathered so that a rather full and detailed analysis can be made of Southern Paiute pottery. The present study, let it be emphasized again, is based on archaeological rather than ethnological field work, and includes the results of both surface survey and excavation.

The area covered by this survey, as previously indicated, ranges from southwestern Utah in the vicinity of St. George, south as far as Needles, California, east to the Whitmore Wash and western Grand Canyon, and west as far as Ash Meadows and the Pahrump Valley in southern Nevada. Within this area about 130 Southern Paiute archaeological sites have been recorded. Of these approximately 120 sites have been visited and surface collections of potsherds and other artifacts made. Fifteen of these sites in the Moapa Valley, the Western Grand Canyon, and along the Colorado River Valley north of Needles have been tested or partially excavated.[26] Thirty-five of these Southern Paiute sites were also occupied by earlier Pueblo groups.

Southern Paiute archaeological campsites along the Muddy, Virgin, and Colorado rivers are commonly located on the south or southeast edge of sand dune areas, while in the higher hills bordering the streams and on the neighboring plateaus they are found around springs or caves or other sheltered areas. These former campsites are characterized by numerous potsherds, scattered pieces of broken firestones, hand hammerstones, flat metates of sandstone, rectangular manos, flakes of chert, chalcedony, and obsidian, small triangular, stemless arrowpoints, and occasionally show shallow pits or depressions marking the presence of house rings. On many of the sites late occupancy is indicated through associated fragments of iron, glass beads, and broken china and glass. On a number of sites along the southern border of the Southern Paiute area the presence of Walapai and Mohave potsherds point to trading visits made by these Yuman groups. Similarly Paiute sherds are found occasionally south of the Colorado River in association with Walapai and Mohave campsites. In cave sites are also found such perishable materials as squash rinds, corncobs, cane arrow shafts and wooden fore-shafts, digging sticks, pieces of coiled and twined woven baskets, yucca cord, coarse netting, yucca-fiber sandals, rabbit-fur blankets, and mescal knives.[27] Mescal pits are numerous throughout this area, particularly in the higher hills and in the western Grand Canyon, and most show occupation or use by prehistoric Pueblo or Patayan groups and also by the historic Paiute.[28]

As previously mentioned potsherds are rather thickly scattered over most of these campsites, 132 sherds being collected from the surface of one in a very few minutes, and a majority of the 120 sites surveyed readily yielded from 50 to 100 sherds each. On sites showing both Pueblo and later Paiute occupation, Paiute sherds are often as abundant on the surface as those of the earlier Pueblo period.

The following description of Southern Paiute pottery is, therefore, based on an analysis of more than 7,000 sherds from over 130 different Paiute archaeological sites, and includes as well several complete and nearly complete vessels.[29]

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[24] Baldwin, 1942*b*, p. 187.

[25] Baldwin, 1948, pp. 128–9.

[26] All field notes and material recovered from these surveys and excavations are on file in the museum laboratory of the National Park Service in Boulder City, Nevada.

[27] Harrington, 1930*b*, pp. 117–22.

[28] Baldwin, 1944, pp. 330–2.

[29] A great deal of sherd material and information was furnished by Mr. Bradley R. Stuart of Moapa, Nevada, who has been intimately acquainted with the Southern Paiute for many years.

SOUTHERN PAIUTE UTILITY WARE

Type site: Nevada DD:7:68, near Overton, Nevada.

Stage: Historic eighteenth and nineteenth centuries, although may extend still farther back into the prehistoric period.

Construction: Normally coiling and thinning with paddle and anvil,[20] although many vessels evidently were also thinned by scraping.

Firing atmosphere: Uncontrolled, but probably mainly reducing, as vessel color ranges from dark gray to black.

Core color: Dark gray to black, occasionally dark brown.

Temper: Very coarse, quartz sand and mica.

Carbon streak: Occasional.

Texture core: Coarse.

Fracture: Usually crumbling, occasionally rather sharp.

Surface finish: Normally rather rough, particularly on interior surface; exterior partially smoothed, occasionally finger indented (Fig. 22); mica and quartz grains show through on interiors, less often on exteriors; interior surface has tendency to flake.

Luster: Dull, light reflecting only from occasional flakes of mica.

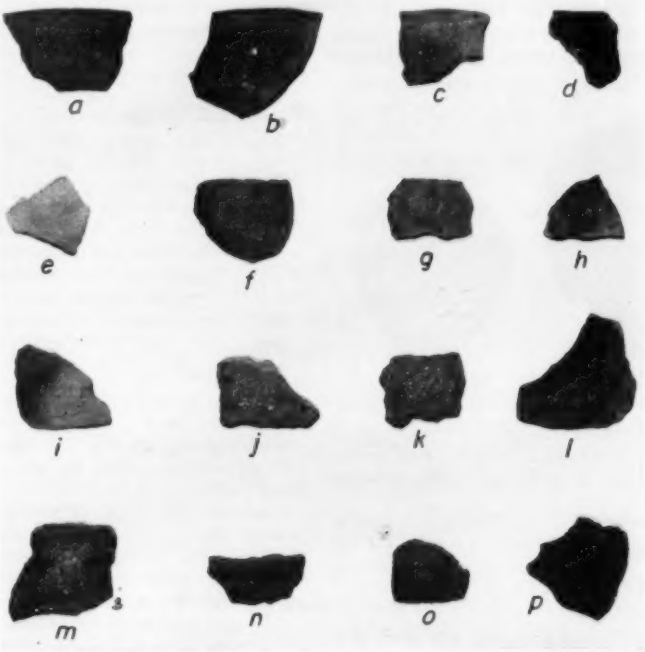

FIG. 22. Southern Paiute sherds illustrating rim form and types of fingernail decoration.

[20] Although this point is readily established by a study of the vessels themselves, it is further verified by ethnological records, as in Steward (1941, p. 242). Lowie (1924, p. 225), however, states that among the Shivwits "a piece of turtle shell served to smooth the vessels within and outside." Harrington (1937, p. 28) also says that the Paiute did not use the paddle and anvil. Among the four northeastern bands studied by Stewart (1942, p. 330), the use of the paddle and anvil was specifically denied by all informants. However, it is altogether possible that both methods were used by the Southern Paiute, perhaps both the time and area involved representing the basis for distinction. Thus, the eastern and northern bands, being closer to Pueblo influence (Gifford, 1928, p. 372), may have used coiling and scraping, while the southern and western bands, affected by the neighboring Yuman groups, particularly the Mohave and Walapai, may have utilized the paddle and anvil Steward (1940, p. 479) even states, "The Ute and some Southern Paiute . . . spread, however, seems to have been up the Colorado River, where they evidently acquired paddle-and-anvil-made pottery from the Yumans." Ute pottery also seems to have been made by coiling and thinning with a wooden paddle and stone anvil (Barber, 1876, p. 452). Kroeber (1935, p. 10) writes of the closeness of the Walapai and Southern Paiute as follows: "Very much closer than the Mohave, in type of culture, were the Chemehuevi and (Southern) Paiute north of the Colorado River. Intercourse was limited across the great chasm. But in land utilization and economy, in point after point in technology, in feebleness of social and religious imagination or organiza-

tion, in general lowness of cultural intensity, as well as in personal disposition, the Walapai are similar to the South-

Surface color: Very dark gray to grayish-brown to black; an occasional specimen may be varying shades of reddish-gray or reddish-brown.

Firing clouds: Yes.

Forms: More common are small to large deep bowls (Fig. 23, *b*) and tall narrow jars, both with pointed or semi-pointed base and more or less conical in form; also rather large jars with very wide mouth (Fig. 23, *a*).

Vessel size: Bowls range from 20 to 38 cm. in diameter and from 18 to 22 cm. in depth; jars range from 18 to 35 cm. in diameter and from 15 to 40 cm. in height.[31]

Base: Extremely thick and either pointed or slightly rounded. It appears likely that the base was molded out of a lump of clay.

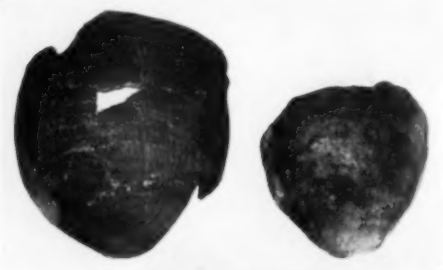

FIG. 23. Southern Paiute pottery vessels.

Thickness of vessel walls: Bowls, 3.5 mm. to 7 mm., averaging 5 mm.; jars, 4 mm. to 13 mm. at the base, averaging 6 mm.

Rims: Bowls, straight to slightly outcurving, rounded or flattened, often uneven (Fig. 22, *a–c*), I A 2, I A 3, I A 4, I B 3, I B 4, I B 12, I E 3;[32] jars, slightly outcurving, uneven, I B 3, I B 7, I B 10, I B 12.

Handles or lugs: None.

Decoration: Often none. A number of jars have small fingernail indentations over entire surface (Figs. 22, *m, n;* 23, *a*),[33] but usually this occurs only as a narrow single band just below rim (Fig. 22, *b*) with remainder of vessel plain. Based on a study of sherds from four representative sites, only 26 per cent of the sherds showed fingernail indentations.

Slip: None.

Paint: None.

Comparisons: Similar in color, texture, and vessel shape to historic Western Apache,[34] Navaho,[35] and Ute[36] plain utility pottery. It also seems to be similar to Northern Paiute pottery of the Owens valley,[37] and to the pottery of the Nevada Shoshoni.[38] There is likewise a close resemblance to prehistoric Gallina Plain utility pottery from north central New Mexico.[39] All this indicates that the ties of Southern Paiute utility pottery are with the general Woodland[40] type of the northern United States rather than with the Pueblo and Hohokam pottery. As Steward has pointed out, there is a general resemblance in paste, finish, and fingernail decoration to the Promontory ware from northern Utah.[41]

Range: Southern Paiute area from Virgin River valley in southwestern Utah, south to Cottonwood valley on the Colorado River, west to the Pahrump valley, and east to the Shivwits Plateau and the western Grand Canyon.

Remarks: Distinctive or characteristic features of this pottery type are the thick pointed or semi-pointed base; conical form; absence of true neck; dark, roughened surface; straight, uneven rim; and fingernail indentations below rim, when present.

On present evidence it would be possible to

ern Paiute." A study of the potsherds themselves indicates that both methods of thinning vessel walls were employed and it is not unusual to find anvil marks on the interior of a sherd and faint scraping marks on the exterior surface of the same sherd (Fig. 22, *i*).

[31] Included in these measurements are those of three specimens from the National Park Service Museum in Overton, Nevada, and four specimens from the Peabody Museum of American Archaeology and Ethnology, the latter furnished through the courtesy of Dr. J. O. Brew, Director. Although a limited amount of research has revealed no other complete vessels, there are doubtless others in certain of the museums in the country.

[32] See Colton and Hargrave (1937, p. 10) for a complete description of this type of rim classification; the above listing of rim types is in approximately the order of their abundance.

[33] Harrington (1930*a*, Fig. 3, *d*) illustrates this style of decoration and also shows one of the characteristic rim forms.

[34] Gladwin, 1935, p. 232, Pl. 39; Douglas, 1935, Fig. 15 and pp. 78–9. Considerable field work in the Western Apache area from 1931–37 has further verified this point to me. My first reaction to Southern Paiute sherds was to remark on their close similarity to Western Apache ware.

[35] Douglas, 1937, p. 14. As Douglas suggests, Southern Paiute pottery frequently resembles the lower half of large Navaho jars, omitting the tall neck, although the former vessels usually have a more conical or pointed bottom than the Navaho.

[36] Huscher and Huscher, 1940, p. 138; Huscher and Huscher, 1943, p. 41, and Pl. 7, *b;* Opler, 1939, pp. 161–3; also personal inspection of Ute potsherds in the Denver Museum of Natural History, 1942.

[37] Steward, 1933, Pl. 5, *b*. This vessel is very much like that shown here in Figure 23, *b* and, as it came from an archaeological site in the Inyo Mountains relatively close to the Ash Meadows area, it is altogether possible that this specimen is Southern Paiute rather than Northern Paiute.

[38] Steward, 1941, p. 242.

[39] Hibben, 1949, pp. 197–8 and Figs. 51 and 54.

[40] Deuel, 1935, pp. 429–45; Wedel, 1940, Fl. 4, *a;* Hill and Kivett, 1940, Pls. 8, 9, 21, and 29; McKern and Ritzenthaler, 1945, pp. 75–8.

[41] Steward, 1936, p. 18; Steward, 1937, p. 43.

break this utility ware down into two separate types on the basis of presence or absence of fingernail indentation. Further, one of these could probably again be divided on the basis of over-all indentation as opposed to single band indentation just below the rim. Eventually, as more material is uncovered and as finer and more detailed classifications are needed, it may be desirable to do this, particularly if time or area distinctions can be made. For the present, however, this subdivision does not seem advisable or necessary.

It is evident from the above discussion that there is still a great deal of work to be done before the final answers can be given to questions concerning the origin and development of Southern Paiute pottery. It is likewise evident that Southern Paiute pottery ties in closely with other Shoshonean pottery and with Ute, Navaho, and Western Apache utility ware and that it is also affiliated with the general Woodland type. Since the possible origins and early developments of the Shoshonean, Athapascan, and Woodland types have already been discussed at some length in other publications,[42] further conjecture at this time does not seem warranted.

Certain speculations and implications can, of course, be found in the preceding pages. However, the primary purpose of this paper was to place on record observations and notes concerning the abundance, type, and distribution of Southern Paiute utility pottery. Additional comments on such controversial subjects as origins and relationships are withheld for the present.

[42] McKern, 1937, pp. 138–43; Steward, 1940, pp. 476–9; Huscher and Huscher, 1942, pp. 86–8; Huscher and Huscher, 1943, pp. 72–83; Hibben, 1949, pp. 200–2.

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National Park Service
Omaha, Nebraska,
November, 1949

PAINTED STONE SLABS OF POINT OF PINES, ARIZONA

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DURING the 1948 summer field session of the University of Arizona Archaeological Field School, located at Point of Pines, Arizona,[1] two painted stone slabs were excavated in a late Pueblo ruin designated as Arizona: W:10:47.[2]

Arizona:W:10:47 was believed to be a small single-phase pueblo occupied during the Point of Pines horizon, *ca.* 1350 to 1400 A.D.[3] It was decided during the course of the summer's work to investigate this ruin, in an attempt to locate wood specimens for dating purposes and to gather information concerning the architecture, ceramics, etc., of this late horizon. The task of sinking the test trenches necessary for the investigation fell to the author and to R. E. Gerald of the University of Arizona.

Three test pits were sunk during a fifteen-day period of excavation. Test 1 was made in the approximate center of the pueblo. This square-meter trench had unknowingly been made in the fill of an old storeroom. The first test exposed a painted stone slab and therefore it was decided to excavate the room completely. The floor was found to be littered with 140 artifacts, 31 of which were ceramic pieces (Fig. 24), the remainder being lithic implements, i.e., metates, manos, ax-heads, rubbing stones, pecking stones, and two painted stone slabs. Because of the great number of artifacts found in the room, it has been suggested that the original inhabitants purposely stored their equipment in the excavated storeroom at a time when the pueblo was abandoned, hoping to return for it at a later date. The bulk of the material was stacked in the middle of the room.

The painted stone slabs were found in the northwest and northeast corners of the room (Fig. 25). Slab 1, in the northwest corner, was lying on the floor with the painted surface turned up and away from the floor, while Slab 2 was in the northeast corner of the room, lying face down in the floor fill at an angle and broken in two.

Slab 1 (Figs. 26, *a*; 27, *a*) consists of a shaped sandstone slab 34 cm. in length, 37 cm. in width, and approximately 4 cm. thick. At the top is a depression drilled into the slab approximately 1.5 cm. in depth and 2 cm. in diameter, which at one time probably supported a round turquoise (?) setting. The surface containing the depression is slipped with a white paint. Directly under the depression are painted a series of six black triangles.[4] The slab is dominated by a masked head consisting of a circle bordered in black and divided across the midsection by a broad red line. The upper half of the circle is painted a blue green having a pair of triangular eye-slits outlined in black, with white pupils. A large red triangle symbolizes the nose. The lower half of the circular mask is painted an orange red. Centrally located in this lower portion is the red outline drawing of a mouth, consisting of two straight lines with four opposing ticks representing teeth. The base of the circle mask consists of a red neck outlined in black. Other figures are located to the right of the mask. They are outlined in black and have a solid green black filler. The upper right hand figure probably represents a toad or frog, and the lower right hand corner contains a figure of a bird. Centrally located directly over the mask is a red headdress, consisting of two attached pendant triangles topped by a red circle, which almost touches the black border of the mask. Undoubtedly, the red figure represents the headdress belonging to the mask. This is strangely reminiscent of a devil-dancer headdress used by the Apaches in the area today. On the left side of the mask is a long black figure badly marked by time and undefinable. On the reverse side of the sandstone slab a number of thin red-line drawings were noted.

[1] The Amerind Foundation, Inc. cooperated with the University of Arizona during the above mentioned field session, which was carried on under the direction of Dr. E. W. Haury. Dr. Haury released the material pertaining to this article and it was with his aid and approval that it was prepared. Mr. E. B. Sayles, of the Arizona State Museum, graciously supplied the photographs used. Mr. T. L. Smiley, of the Laboratory of Tree-Ring Research, Tucson, aided in the preparation of the site map. Mr. R. E. Gerald, student at the University of Arizona, assisted in the actual excavations.

[2] University of Arizona Survey system.

[3] Unpublished field report at the University of Arizona, Department of Anthropology.

[4] Fewkes (1904, p. 104) terms the triangle a symbol of either a rain god or a butterfly, according to old Hopi symbolism.

FIG. 24. Photograph of Room 1 of Arizona:W:10:47, where Painted Slabs 1 and 2 were found, showing artifacts *in situ*.

Slab 2 (Figs. 26, *b;* 27 *b*) is approximately 49 cm. in length, 17 cm. in width at its base, and 12.5 cm. in width at its top, and is approximately 4 cm. thick. As in the case of Slab 1, a white paint pigment is used as a base color. The slab is slipped from its top portion down to within 7 cm. of its base (this area being unpainted). Two perforations were located near the top of the slab. It is possible that they were used either as suspension holes for hanging the slab or for the suspension of some added decorations. Midway between the two perforations is a zigzag line approximately 6 cm. in length painted in red and yellow. At a distance of 19 cm. from the top of the slab an arched line, also painted red and yellow, bisects the slab. Below the red and yellow arch, at a distance of approximately 12 cm., a circular mask 9 cm. in diameter dominates the scene. The mask is outlined with a heavy black border approximately 1.8 cm. thick. The interior of the mask is divided into halves by two parallel red lines running horizontally across the figure. The upper half of the mask is painted white and has

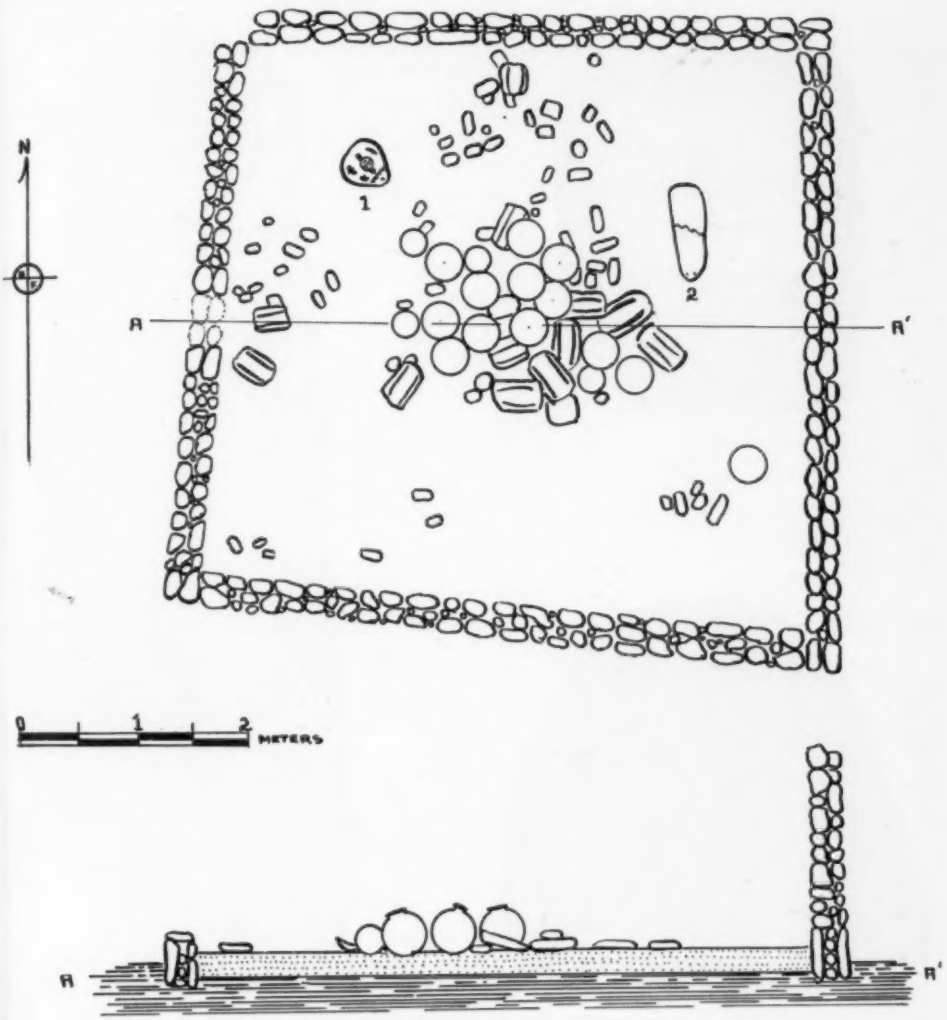

FIG. 25. Outline drawing of Room 1 of Arizona:W:10:47, where Painted Slabs 1 and 2 were found. (Note position of painted slabs marked 1 and 2.)

two semicircular eyes bordered in brown. The lower half of the circle is painted an orange red. The mouth symbols present on Slabs 1 and 3 are absent on Slab 2. The circular mask, apparently a sun symbol, was marked with 38 radiating red rays each approximately 3 cm in length. Below this there are four parallel radiating lines painted black, yellow, white, and red. The white base slip extends 5 cm. below the last red line.

During the 1947 season at Point of Pines a stone slab with a mask painted on its surface was found while excavating the ruin Arizona:W:10:50[5] under similar circumstances, i.e., in a room filled with artifacts and presumed to be a storeroom. This slab differs from the other two painted slabs described in that one

[5] University of Arizona survey system.

FIG. 26. Photographs of Painted Slabs 1, 2, and 3, Arizona:W:10:47.

entire surface of the sandstone was painted to resemble a single masked figure.

Slab 3 (Figs. 26, *b;* 27, *b*)[6] measured 29.5 cm. in length, 25.2 cm. in width, and 4.2 cm. in thickness. The painted area is bordered by a broad black line running from the outside edge of the slab at a thickness of approximately 2 cm. The actual mask measures 24 cm. in length and 21.5 cm. in width and is divided in half by a horizontal black line 1 cm. thick. The upper half of the mask is painted with a turquoise green color for 14.5 cm. On the green background are two eyes, a nose, and a mouth. The eyes are outlined in black and have white

[6] This slab is temporarily on display at the Amerind Foundation Museum while Slabs 1 and 2 are in possession of the Arizona State Museum.

pupils. They begin at the outer black border and extend inward toward the nose for a distance of 9 cm. The nose is a rectangular block of red pigment measuring 5 cm. in length and 2.5 cm. in width. The mouth consists of two parallel black lines 4 cm. in length ticked in counterpoint with six white ticks representing teeth. The lower section of the mask measures 9 cm. in length and is painted a deep ocher red.

The three Point of Pines slabs were all associated with late horizon pueblos. It is interesting to note the geographical spread of other painted slabs found in late Pueblo ruins (Fig. 28). Cummings describes an altar slab coming from the ruin of Kinishba located north of Globe, Arizona:

> The figure painted on the large stone tablet from room 198 with its sun-shaped mask, clouds in its headdress, lightning wands in its hands, and stalks of growing corn on either side is strikingly like the figures on the Hopi plaques and wands in use at the present time. They are a strong argument that ancestors of the modern Hopi once lived at Kinishba.[7]

In 1931 Haury and Hargrave[8] reported finding a painted altar slab at the Pinedale ruin in east central Arizona near Showlow. They date the slab at post 1286 A.D. The Pinedale slab differs from the other slabs under discussion in that it has a large central perforation and is comparable to a similarly shaped object used by the Zuñi and described by Stevenson.[9] Haury and Hargrave also mentioned that a Mr. Whipple of Showlow, Arizona, possessed three or four painted slabs found in living rooms at the Showlow ruin which, unfortunately, have never been officially reported upon.

To the east at Pecos ruin, New Mexico, Kidder found two painted slabs, both in ceremonial caches buried under the surface of the North Quadrangle Plaza.[10] Figure 73 of Kidder's report depicts a slab painted with a circular mask not dissimilar to the Point of Pines Masks 1 and 2. Kidder comments in regard to the use of these masks as follows:

> In the field notes we referred to these objects as "altar-slabs," and this is perhaps as good a guess as can be made.

Kidder placed his altar slabs in a very late Pueblo horizon, stating that they probably belonged to the post-Spanish period at Pecos.

Fewkes remarked on the presence of stone slabs found at the Chevlon, Sityatki, Four Mile, and Homolobi ruins. He believed the slabs had a relationship to the modern Hopi ceremonialism stating:

> The use of slats or slabs of stone decorated with figures painted in various pigments has been described in accounts of several Hopi altars. One of the most remarkable of these is probably the stone called the Hokona mana, or Butterfly virgin, which is used in the construction of the Antelope altar at Walpi. Two flat rectangular stones stand back of the sand picture of the Antelope priesthood in the Snake rites at Shumopovi, while the use of similar stones in the

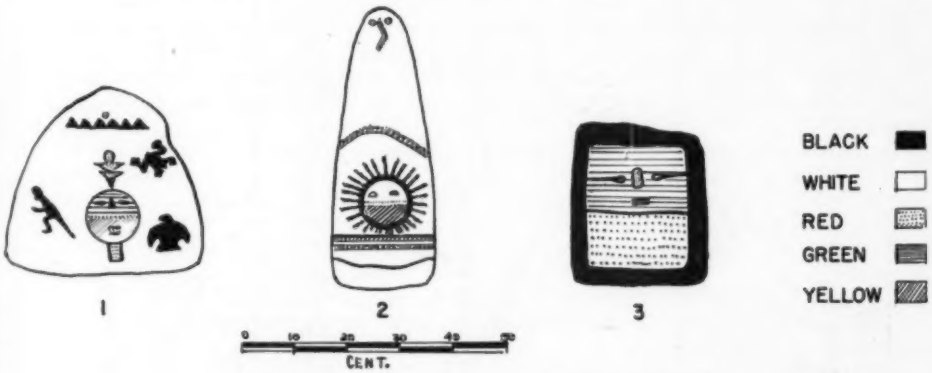

FIG. 27. Drawings of Painted Slabs 1, 2, and 3, Arizona:W:10:47

[7] Cummings, 1940, p. 107, Pl. XXXIV.

[8] Haury and Hargrave, 1931, pp. 56–9, Fig. 14.

[9] Stevenson, 1904, pp. 94–102.

[10] Kidder, 1932, pp. 96–8, Figs. 72 and 73.

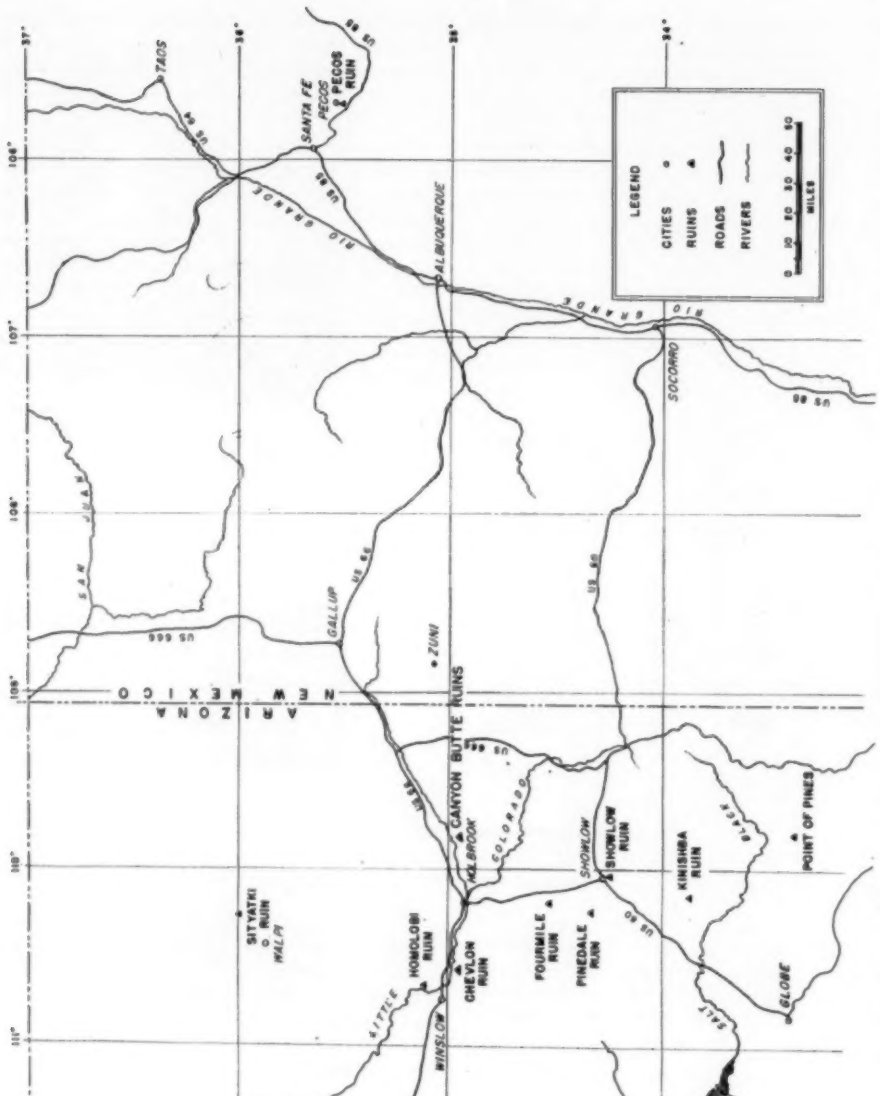

FIG. 28. Map of east central Arizona and west central New Mexico, showing locations of ruins where painted slabs have been found.

various Flute altars may be seen by consulting articles on these rites.[11]

Fewkes commented also on a painted slab found in a grave at Chevlon ruin:

> In his report on the operations in 1896 at Homolobi and the Chevlon ruin, the author called attention to the presence in graves of stone slabs on which figures of rain clouds were depicted, and in the excavations at Sityatki he found similarly decorated stone objects. The practice of burying stone slabs ornamented with rain-cloud symbols was not unknown at Four Mile ruin, as one of the objects from graves at that place attests. This specimen has a rectangular form and is decorated with a terraced rain cloud painted in black outline on one side. It is possible that the grave from which this slab was taken was that of a priest, and that this object was formerly used in ceremonies, as is the case with certain altar paraphernalia of the same character in the modern ritual of the Hopi Indians.[12]

Hough reported one other painted slab, which he located at the Canyon Butte Wash site in Arizona.[13] This slab was described as a tablet measuring 12 inches in length, 7 inches in width, and 2 inches in thickness. The painted face consisted of a black rain-cloud design, not unlike the design found on the Point of Pines Slab 1. It was found in the cemetery of Ruin 1 of the Canyon Butte Site.

To the author's knowledge, the above mentioned ruins are the only ones in which painted slabs were found. With the exception of the Pecos ruin, the ruins are all located in east and north central Arizona and suggest, by their geographical position, the use of painted slabs by the late Pueblo people who were ancestral to either the Hopi or the Zuñi Indians of today, or possibly, as Fewkes suggests, to both groups:

> The objects exhumed from the cemeteries of the Chevlon ruin have close likenesses to those of ancient Zuñi ruins, as well as to those of Homolobi, which is claimed by the Hopis. A logical interpretation of these resemblances would seem to be that the cultural differentiation of the two peoples was not as wide in ancient times as it is at present. The inhabitants of the villages of the Little Colorado and its tributary the Zuñi river, were formerly closely related, and, no doubt, when these villages were deserted, some of the clans went to Zuñi and others to the Hopi pueblos. In subsequent times greater differentiation took place, which led to the present conditions.[14]

In summarizing it is well to note the positions in which the slabs were located. At Point of Pines they were in storerooms, apparently stored there when the pueblo was abandoned. At Kinishba a slab was found in Store Room 198. At Homolovi, Sityatki, Chevlon, Four Mile, and Canyon Butte ruins they were parts of funeral caches. At Pecos they were found in plaza caches. It is also interesting to note that several broken pieces of a painted slab were found as part of the flagstone floor of a rectangular kiva excavated at the ruin Arizona W:10:47 at Point of Pines.[15]

The presence of painted stone slabs at Point of Pines arouses a number of very interesting questions:

1. Were the inhabitants of Arizona W:10:47 ancestral to the Hopi or to the Zuñi, or to both groups? Fewkes and Cummings both suggest that the painted stone slabs bore affiliations with the Hopi. Fewkes further suggests that both the Hopi and the Zuñi may have come from the same stock. However Stevenson, in her excellent study of the Zuñi, photographed a sun shrine of *Ma sakia*[16] which shows a sandstone slab about 2 feet high and 14 inches wide which has a symbol of the sun (4 inches in diameter) etched upon it. This incised sandstone slab was used as part of the religious paraphernalia of an outdoor shrine belonging to the Zuñi rain priests (*A-shiwanni*) and used during the winter solstice ceremonies.[17] The Zuñi slab is strikingly similar to Slab 2 at Point of Pines. To be sure, the design on the modern slab is incised where the older slab is painted, but the design elements and the very shape of the slab are similar. Naturally, the above question cannot be satisfactorily answered solely on the strength of the similarity of a single artifact to a modern slab. One must await the final conclusions to be derived from a thorough study of the Point of Pines area.

2. What do the painted slabs indicate regarding the antiquity of the kachina complex? The author is cognizant of the fact that the kachina complex is continually changing and that it is extremely dangerous to link the masked figures on the Point of Pines slabs to present-day

Fig. 28. Map of east central Arizona and west central New Mexico, showing locations of ruins where painted slabs have been found.

[11] Fewkes, 1904, pp. 104–5, Pl. XLVI. See also Fewkes, 1898, pp. 963–1020, Fig. 43, Pl. LXV.

[12] *Ibid.*, p. 162.

[13] Hough, 1901, p. 311, and Pl. 42, *2*.

[14] Fewkes, 1904, Pt. I, p. 23.

[15] Mr. T. L. Smiley excavated Kiva 1 (Arizona:W:10:47) during the 1948 field session. His findings are being prepared for publication.

[16] Stevenson, 1904, p. 118, Fig. 3.

[17] *Ibid.*, pp. 108–41.

kachina types. However, it is obvious that the masks present on Slabs 1 and 2 represent the sun symbol which, today, is included among the hierarchy of Hopi kachinas as the Tawa Kachina.[18] There are certainly similarities in the representation of the present-day sun kachina and the masked figures on the sandstone tablets. Both masks consist of circular heads with radiation lines present around the face of the sun symbol. Slab 2 had 32 radiation lines painted on the slab in red paint, whereas the modern kachina consists of a number of feathers encircling the mask. The possibility of obtaining further results along this line would be enhanced if a competent ethnologist could work hand in hand with the archaeologist in the field. There is an apparent need for such integrated studies, especially when a project is being carried on in the late horizons in the Southwest.

3. Does the presence of masked figures on the slabs suggest that masks were incorporated in pre-Columbian religious ceremonies as they are among the present-day Pueblo groups? Slabs 1 and 2 possibly suggest a simple symbolic portrayal of the sun. These slabs may have been used as altar slabs or as part of the paraphernalia of an outdoor shrine, similar to the Zuñi sun shrine. Slab 3 however, suggests that the late inhabitants of Point of Pines were familiar with religious masks. Parsons[19] states that if masks were used in pre-Spanish times they were chiefly confined to the western sector of the Pueblo area, more specifically to the territory claimed by the Hopi and the Zuñi. Haury[20] obtained further evidence suggesting the use of religious masks in pre-Columbian times at Double Butte cave, Arizona, where he found a *paho* shaped in the form of a "proto-kachina," which had painted on it a mask similar to that of a *Sio Humis* kachina. Slab 3 is highly suggestive of the presence and use of religious masks in pre-Columbian times.

4. Did the stone slabs represent paraphernalia used as altar decorations? Unfortunately none of the painted slabs reported in the Southwest were found *in situ* on an altar. However, present-day Pueblo altars are made up only during the actual ceremonies and are dismantled before the ceremony ends, when the various altar furnishings are returned to their proper "keepers." It may well be that the prehistoric slabs were stored in "clan-houses" while not in use or perhaps the storerooms themselves represent rooms dedicated to the anthropic worship similar to the Zuñi *ki wi siwe*,[21] which are rooms built above ground, rectangular in shape, and contsructed of stone. The present-day Zuñi *ki wi siwe* are entered by means of a roof hatchway during religious ceremonies, when the side entrances and small windows are sealed off.[22] Zuñi ceremonial rooms have been known to have side entrances,[23] as did the storeroom at Arizona:W:10:47, but the presence of so many artifacts on the floor of the room suggests that the room may have been used as a storeroom and that the slabs were taken from the altars of either a kiva, an aboveground ceremonial room, or an outdoor shrine, and stored at a time when the inhabitants of the site left the area in search of new homes.

Undoubtedly the work of the University of Arizona archaeological field school under the direction of Dr. E. W. Haury will in the future be able to answer a great many of the knotty problems concerning the affinity of the present Hopi or Zuñi groups to the inhabitants of the Point of Pines area. As this paper was written purely as a descriptive note, the ultimate conclusions regarding the makers of painted slabs must wait until the associational material culture is reported upon.

[18] Fewkes, 1903, p. 100, Pl. XXXVIII; Colton, 1949, p. 54.

[19] Parsons, 1930, p. 594.

[20] Haury, 1945, pp. 196–200, Fig. 128, *c*.

[21] Stevenson, 1904, p. 62.

[22] *Ibid*.

[23] Smiley, 1949, master's thesis (unpublished).

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Amerind Foundation, Inc.
Dragoon, Arizona
October, 1949

FACTS AND COMMENTS

A PRELIMINARY REPORT OF AN ARCHAEOLOGICAL RECONNAISSANCE OF THE KUKPOWRUK AND KOKOLIK RIVERS IN NORTHWEST ALASKA

Through the cooperation of the Bureau of American Ethnology,[1] Smithsonian Institution, with the U. S. Geological Survey and the Office of Naval Research, Ralph S. Solecki, archaeologist, was sent to northwest Alaska during the summer of 1949 to accompany a field party of government geologists. His task was to make an archaeological reconnaissance of the Kukpowruk and Kokolik rivers. It is to be recalled that in 1947 Raymond M. Thompson (1948) of the Geological Survey found 17 chipping stations and one Folsom point on the Utukok River, the next river to the east. The Folsom point, unfortunately, was obtained on the surface of a high ridge unaccompanied by any other aboriginal material. The hope was expressed that more Early Man data might be recovered in the nearby vicinity. To that end the results of the present exploration were gratifying since, although no additional Folsom artifacts were obtained, specimens of putatively respectable antiquity were brought back. Not to be minimized are the data pertaining to prehistoric and historic inland Eskimo from this part of Alaska, which are now available for study for the first time. This information is wholly new and opens new vistas of research.

The northern part of Alaska, called the "North Slope," has an arid climate. Physiographically, the northern part of the territory is divided into three provinces (Smith and Mertie, 1930, pp. 32–51): (1) the Brooks Range, (2) the Arctic Plateaus, and (3) the Arctic Coastal Plain. Brooks Range comprises several ranges of glaciated mountains, representing the Alaskan counterpart of the Rocky Mountains. The Arctic Plateaus (also called Foothills) province is a hilly region between the mountainous Brooks Range and the nearly flat Coastal Plain. The latter is characterized by abundant lakes and swampy areas, wet tundra, and meandering streams. Neither the Foothills nor the Coastal Plain were ever glaciated. The main drainage system on the north slope is the Colville River, which flows in a great basin easterly and northerly to the Arctic Ocean.

The Survey sent out six parties of geologists during the 1949 season to examine different parts of the petroleum reserve (Naval Petroleum Reserve No. 4). The base was at Umiat, about 175 miles southeast of Point Barrow. Party No. 6, led by Robert M. Chapman, was to examine the Kukpowruk and the Kokolik rivers from the heads of these streams in the De Long Mountains down to their outlets at Point Lay on the Arctic Ocean.

An opportunity was obtained to brief the leaders of the five other Geological Survey parties before they left for the field, giving them some idea of what they might do in the way of archaeological survey in their respective areas. The party leaders were interviewed at the end of the season, and the author collected such data as they had an opportunity to find for him. On record are 12 archaeological sites and 19 historic and recent Eskimo camp sites which the geologists located in different river drainages of the Colville Basin and of the north slope. These sites extended over a linear distance of some 200 miles in the lower central part of the reserve area. None of the archaeological specimens, consisting of some reject flint blades and flakes, differ from the majority of the remains[2] found on the Kukpowruk and Kokolik rivers.

The stone artifacts for the most part were made of native flint found locally in outcrops and occurring as loose cobbles. The principal color is a gray, with varying shades of green. Specimens of red and black flint occur less frequently.

The members of Party No. 6, with which the author traveled, helped immeasurably with the reconnaissance, and showed a keen interest in the archaeology. Recorded for the Kukpowruk and Kokolik rivers are 192 archaeological sites, including three hunting camp sites, one possible village site on the coast, and two historic contact village sites. Also found were 33 recent Eskimo hunting camps, four isolated groups of hunting blinds or wind breaks erected of stone, and four stone deadfall traps. Most of the sites were chipping stations situated high on the hills or on prominent knobs which offered a good view of the surrounding country. Presumably these were the places where the hunters lay in wait for caribou. Two of the chipping stations yielded a stone industry typologically similar to that found on the University of Alaska Campus site (Rainey, 1939, pp. 381–9).

On the basis of the finds, we might postulate three phases of cultural history in northern interior Alaska. The data range from the lamellar flakes and cores, which have been called Mesolithic (Nelson, 1937, p. 269) in type, through artifacts of a prehistoric hunting occupation, to more recent evidence of the historic "Nunatagmiut" Eskimo (Stefansson, 1914, pp. 10–11), who were also hunters. The earliest phase might be called the University of Alaska Campus phase; the second, the Colville Basin phase; and the last, the Western Interior Eskimo phase. There is no apparent link between the University of Alaska Campus phase and the Colville Basin phase, while the latter is seen to merge very nicely into the Western Interior Eskimo phase or Nunatagmiut, from prehistoric to historic in time.

The two sites (Nos. 65, 121) of the University of Alaska Campus phase, which were surface collected, yielded polyhedral cores, lamellar flakes, and several end scrapers, in addition to the usual workshop flint debris. One finished triangular projectile point of black flint, the only representative of the projectile point category, was found on the surface of Site 65. It is 3.5 cm. long, moderately tapered from a base 1.8 cm. wide. The base is shallowly concave,

[1] The arrangements were made by Dr. Frank H. H. Roberts, Jr., of the Bureau of American Ethnology; Dr. John C. Reed, of the U. S. Geological Survey; and Dr. M. C. Shelesnyak, of the Office of Naval Research.

[2] Called Colville Basin phase below.

and the chipping is not in any way distinctive. Other than finding this artifact on the same site, there seems to be no reason for linking this point with the polyhedral cores and their derivatives. No recognized Colville Basin phase material accompanied these objects. One additional note, Site 121 yielded the commoner and typical polyhedral cores of a type similar to that illustrated by Nelson (1937, p. 271, Fig. 16, *a*). On the other site (No. 65), two cores of much larger size were found, one measuring an average of 7.5 cm. long and an average of 6 cm. across the platformed base (Fig. 29).[3] The prerequisites for conically-shaped cores have been most nearly met by these two specimens, which show a preciseness of large flake detachment not to be found thus far anywhere in Alaska. They are well patinated. The largest flake detached measures 8.5 cm. long and 1 cm. in median width (approximate). Nelson (*ibid.*, pp. 270–1) remarks that the Mongolian and Alaskan cores were small, while the paleolithic European cores were larger. This seems to give us fruit for speculation, as the size of the cores from Site 65 would by deduction place it in another category, more related to Eurasia than Asia in the Old World. In any event, the sphere of prepared cores and lamellar flakes has been geographically enlarged in Alaska.

The Colville Basin phase is represented by some 186 sites, the majority of which were chipping stations. Fortunately, one of the larger hunting camps was found, giving us a list of some of the cultural traits other than the stone industry. The trait complex for this phase consists of antlers and bones cut with stone tools; antler root picks; large flint blades and scrapers; the typical Eskimo long, narrow, stemmed, projectile point; gravel-tempered pottery similar to coastal Eskimo pottery; some slate; a perforated bear tooth; hammerstones; and a jade adz set in an antler handle. The non-lithic material differs in no way from protohistoric coastal Eskimo objects. The extreme ecological importance of caribou hunting is very much evidenced from the cultural remains and debris. Absent from this type site are historic contact materials. Significantly absent also are polyhedral cores and lamellar flakes of the University of Alaska Campus phase. It might be added at this point that even with the relative closeness of Point Hope[4] and the Ipiutak culture (Larsen and Rainey, 1948), we have no indications of Ipiutak peoples inland in the Colville Basin, to the author's knowledge.

The last phase, called here the Western Inland Eskimo phase, is, as indicated above, historic in time with a dependence on caribou hunting. One small village of eight houses was found on a riverside terrace about 35 miles from the coast. These houses were rectangular (averaging 9×14 ft.), with a short side entrance to the south and a central fireplace lined with stone slabs. Historic contact material was much in evidence. There were signs of ax cuts on the timbers (undoubtedly coastal driftwood), and the animal bones were cut with metal saws. None of the houses were of the deep subterranean type. Sled runners of whale bone were found—items thus far lacking in the Colville Basin phase. A hunting camp found in the foothills yielded both a good sample of aboriginal stone work and some historic contact material, tying the prehistoric to the protohistoric or historic periods.

One village site of the coastal Eskimo type was found near the mouth of the Kukpowruk River. This village, containing 29 structural features, was of late date, possibly about 1900. There were 19 houses ranged along the river bank, with sunken entrance tunnels. However, the inhabitants had not forgotten the flint-working industry, as flint chips were recovered in a brief examination of one of the house floors, and some flakes were found in the village area. The central fireplace was absent. All of the bones and antlers of caribou were saw cut. Whale bones cut by metal saws were also in evidence. This village is characteristic of the coastal Eskimo.

FIG. 29. Polyhedral core from Site 65, northwest Alaska.

In summary we may state that:

1. The finds of "Mesolithic" cores in northern Alaska point up additional Early Man evidence in a hypothetical migration route from Asia. The geographical scope of the University of Alaska phase is enlarged.
2. An inkling of the prehistoric Eskimo archaeology is available for the first time in the interior of Alaska's north slope.
3. The linking of inland prehistoric Eskimo to historic inland Nunatagmiut Eskimo is seen possible. The coastal Eskimo relations with the inland Eskimos is yet to be worked out from the archaeology.

The author's survey, plus the indications of archaeology brought forward by the geologists, shows that there is a considerable field of investigation in the North Slope of Alaska. Giddings' discovery (1949) and subsequent researches on Early Man material at Cape Denbigh have

[3] Samples of lithic, dendrochronological, and ethnological material were left with the University of Alaska Museum by the Bureau of American Ethnology. One of the large cores is in the Alaska Museum collections.

[4] Approximately 85 airline miles from Pt. Hope to the headwaters of the Kukpowruk River.

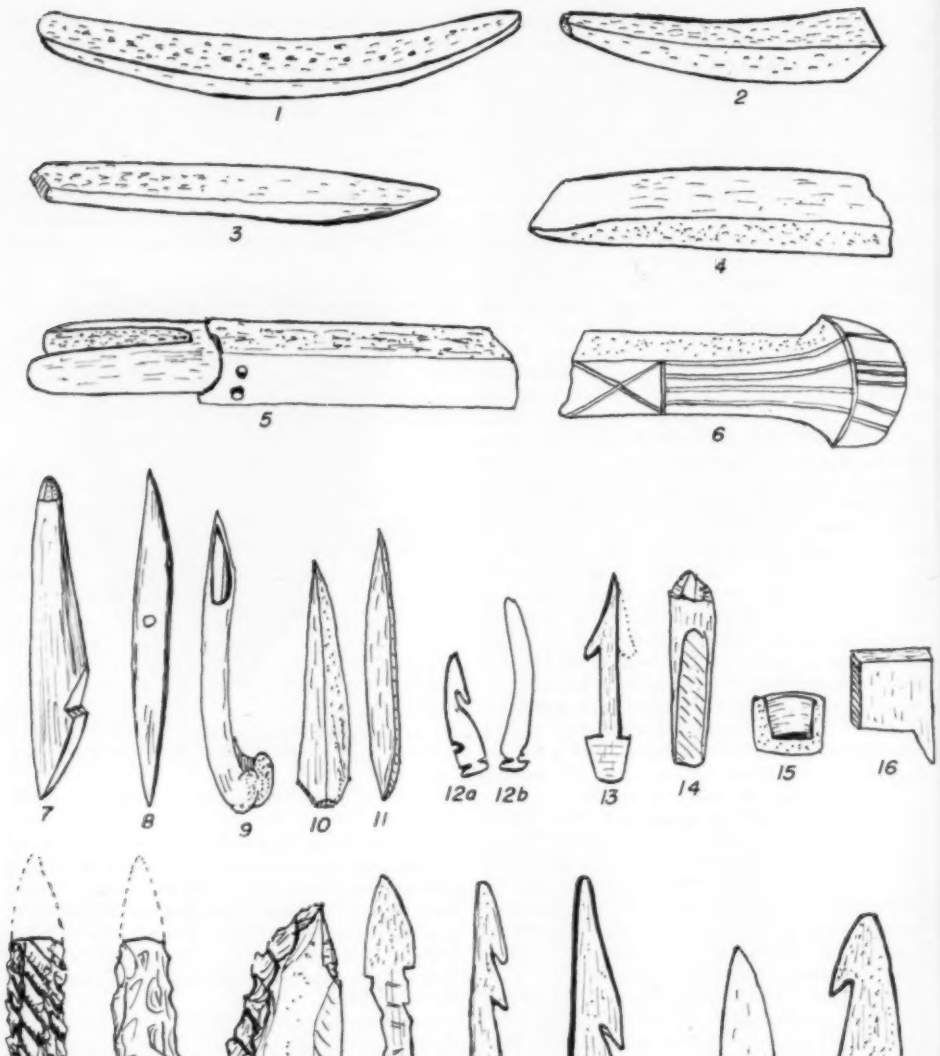

FIG. 30. Artifacts from Shemya, Aleutian Islands. (See text for explanation.)

given us a long-awaited springboard to the cultural prehistory of the area. With the additional knowledge on northern Alaska presented here, we can help break the deadlock on the problems of migration routes, Eskimo origins, and other nagging questions for which heretofore we have had only speculative answers.

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ARTIFACTS FROM SHEMYA, ALEUTIAN ISLANDS

In the collections of the W. H. Over Museum, University of South Dakota is a small group of artifacts taken from Shemya Island, one of the Semichi Group. This island group lies to the east of Attu and is visible on clear days. The collection of artifacts is small but has some value in defining the little known cultural complexes on the west end of the island chain. These artifacts were obtained by Mr. C. B. Kimbrough, an engineer of a construction projection for the Baker Engineering Company of Rochester, Pennsylvania. In building the airport, a steam shovel destroyed a mound on Shemya and the collection consists of artifacts which were saved.

Several of the artifacts represent types found at Krugloi Point, Agattu Island by the University of Michigan Expedition to the Aleutians, 1949. There are, however, some major differences, a significant one being that, of the hundreds of artifacts from Krugloi Point, no examples of the toggle-headed harpoon or the harpoon with a split recess for an inserted blade was found. Yet in the small collections from Shemya there are examples of both these types. The stone blades and points and several of the bone and antler artifacts are similar in both the Agattu and Shemya complexes. Since the distance separating these two islands is only a little over 30 miles, a time difference is suggested.

The following is a brief catalog and description of the artifacts, which are illustrated in Figure 30:

1. Root digger made of a curved piece of polished bone with rounded ends. 23×20×12 mm. Found also at Agattu.
2. Root digger or flaking tool, polished antler, worked end, 145×22×20 mm. Present at Agattu.
3. Polished bone tool, possibly an awl, but with a broad, blunt tip. 142×14×8 mm. Present at Agattu.
4. Polished bone wedge. 89×34×11 mm. Present at Agattu.
5. Large bone harpoon head with split end for blade, closed socket in base, line hole. 264×40×30 mm.
6. Broken ivory harpoon head, same type as (5), closed socket in base, geometric incised design. 150×50×30 mm.
7. A blunt-nosed ivory projectile point or foreshaft with a notched, beveled base. 124×14×12 mm. Present at Agattu.
8. Bone needle with hole in center. 100×6×3 mm. Present at Agattu.
9. Polished awl of bird bone. 90×10×8 mm. Present at Agattu.
10. Awl made of bone splinter. 61×14×8 mm. At Agattu.
11. Polished awl made of bone splinter. 73×8×2 mm. At Agattu.
12. Compound polished bone fishhook, small grooves at bases for tying the two pieces together. *A*, 10×8×2 mm. *B*, 36×6×2 mm. Present at Agattu.
13. Bone arrowpoint, one barb missing, wedge-shaped base. 38×8×3 mm.
14. Blunt-nosed ivory point or foreshaft with beveled base. 44×10×8 mm. Present at Agattu.
15. Fragment of a cup-shaped piece of carved bone. 20×15×5 mm.
16. Rectangular piece of ivory with single spur. 20×14×5 mm.
17. Serrated point of green basalt with base and tip missing, fine chipping. 78×18×8 mm. At Agattu.
18. Same as (16) except that it has slightly rounded shoulders. 74×21×9 mm.
19. Broken basalt blade, flaked on one side. 80×51×13 mm. At Agattu.
20. Long bone projectile point, possibly a leister tip, poorly made. 99×11×8 mm.
21. Double-barbed bone point. 120×10×6 mm. Common at Agattu.
22. Double-barbed harpoon head with slit tip for blade. 98×12×9 mm.
23. Ivory toggle-headed harpoon point, closed socket, line hole in middle. 55×13×8 mm.
24. Double-barbed, toggle-headed bone harpoon head, lacking socket and line hole. 73×18×11 mm.

A comparison with the traits given by Martin, Quimby, and Collier for the Aleutian Islands suggests a relationship, based on harpoon types, to their "Middle Aleut culture." They state that toggle-headed harpoons and lanceheads were made with slots instead of beds for the attachment of blades in the fashion of their "Early Aleut" culture.[1] Other artifacts on the whole fit into both their "Early and Middle Aleut cultures."[2] The collection from Shemya is not large enough to place it more definitely in their Aleut cultural framework.

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November, 1949

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[1] Paul S. Martin, George I. Quimby, and Donald Collier, *Indians before Columbus*, Chicago: University of Chicago Press, 1948, p. 493.
[2] *Ibid.*, Fig. 118, *c*.

A FRAGMENT OF NORTHERN CALIFORNIA BASKETRY FROM SOUTHERN CALIFORNIA

Among the artifacts brought back by a U.C.L.A. survey party from a small dry cave located about 40 miles north of Barstow, California were 22 fragments of basketry. This, in itself, is not remarkable but 11 different weaves and variations were represented in this small collection. In general these are the coiled, twined, and wicker weaves that are widespread throughout the southwestern and California desert areas. However, one specimen is woven with a closely twined weave on a two-ply twisted warp. This type of work has been reported as being peculiar to northern California and southern Oregon, among the Klamath and adjacent tribes. Ruth Merrill[1] states that "the Klamath, with their two strand twisted tule, are the only tribe using a multiple warp in twining." Fenenga and Riddell[2] illustrate and describe samples of this type of basketry which they excavated from the Tommy Tucker cave in Lassen County, California. The present specimen is woven of a little finer material than that illustrated by Fenenga and Riddell, having 17 warps and 26 weft rows in 5 cm., and is undecorated. This small fragment has a cylindric form with an internal diameter of approximately one inch and possesses a slight flare, as well as showing a decrease in the number of warps. This shape suggests the neck of a bottle but there may have been considerable deformation while in the deposit of the cave. There is no present indication that the basketry was coated with pitch or other waterproofing material.

The main point of interest here is that a sample of twined basketry woven on a two-ply twisted warp was found some 500 miles, air line, southeasterly from its normal provenience. This may be interpreted as another bit of evidence for the contact that has been indicated between the tribes of northern California and those of the Southwest.[3] It further suggests that the route followed in making some of these contacts was south through the Owens Valley and then eastward across the Mojave Desert, to the south of Death Valley. The trade route from the Southwest to southern California[4] has been well established, and this find may indicate that there was a northern branch to that route and that the two separated somewhere in the vicinity of Soda Lake.

The archaeological material from this cave has not been completely worked over, so, at present, there is no definite evidence as to the relative age of the deposit.

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[1] Ruth Earl Merrill, "Plants Used by the California Indians," *University of California Publications in American Archaeology and Ethnology*, Vol. 20, Berkeley, 1923, p. 220.

[2] Franklin Fenenga and Francis A. Riddell, "Excavation of Tommy Tucker Cave, Lassen County, California," AMERICAN ANTIQUITY, Vol. 14, No. 3, 1949, p. 205.

[3] Robert F. Heizer, "Aboriginal Trade between the Southwest and California," *Masterkey*, Vol. 15, pp. 185–8, Los Angeles: Southwest Museum, 1941.

[4] Malcolm F. Farmer, "The Mohave Trade Route," *Masterkey*, Vol. 9, pp. 154–7, Los Angeles: Southwest Museum, 1935.

EAR SPOOLS?

Objects of the type illustrated in Figure 31 have been classed as ear spools by some of the earlier investigators. One was found recently with a Hopewell burial in a mound at Kampsville, Calhoun County, Illinois, which casts some doubt as to the correctness of this interpretation. This particular piece was found on the chest of the individual and not at the side of the head or neck where ear ornaments are usually expected. The burial was in a clay-like soil which held the four flat, almost circular pearl beads in the position shown in Fig. 31, *D*. They surrounded a specimen made of bone, which is $1\frac{7}{8}$ in. in diameter by $\frac{3}{8}$ in. thick. Its general shape is that of a pulley wheel, the groove being around the outer margin as shown in the fragmentary piece, Fig. 31, *A*. Eight holes have been drilled perpendicularly through the body and arranged in four groups of two each, with a bead placed in relation to each pair of holes as shown in the x-ray, Fig. 31, D^1.

Fig. 31, *B* is also made of bone and, along with the fragment (Fig. 31, *A*), was found on the chest of a female burial in Mound 16 of the Knight Group in Calhoun County, Illinois. This is the only incidence in our series of two of these objects having been found with the same burial. It is $1\frac{3}{4}$ in. in diameter and $\frac{3}{8}$ in. thick with eight holes (Fig. 31, B^1), whose placement is so irregular that no definite idea of pairing is obtained. It can also be seen in the x-ray (Fig. 31, *B*) that it was broken into three pieces and repaired.

A pottery specimen (Fig. 31, *C*) was found at the side of the neck of a female burial in Mound 22 of the Knight Group. It is $1\frac{3}{4}$ in. in diameter and 9/16 in. thick. No tempering is seen. The x-ray (Fig. 31, C^1) shows that nine holes have been rather evenly spaced.

Dr. J. F. Snyder in the 1880's found two pairs of these pieces in the Baehr mound in Brown County, Illinois. He reports that one pair was found one on each side of the skull and the other pair, where the head of the burial probably had been. Two of these pieces are illustrated by Griffin[1] in the *Prehistory Research Series* of the Indiana Historical Society. One is thought to be of the type with four pairs of holes and the other with several individual holes evenly spaced.

One such piece is reported by Charles C. Willoughby[2] as having been found on the altar of Mound 3, Turner Group, Hamilton County, Ohio. From his drawing four pairs of holes are thought to be present.

John C. McGregor,[3] University of Illinois, reports a specimen from Pulaski County in southern Illinois. There was a basal platform in the bottom of a mound, in the center of which was a rectangular crematory basin. In small pits around this basin were masses of cremated bones. The piece in question came from one of these pits. It is made of pottery, possibly sand tempered, and is $1\frac{3}{8}$ in. in diameter and $\frac{3}{8}$ in. thick. It contains nine holes, eight of which are

[1] James B. Griffin, "Additional Hopewell Materials from Illinois," *Prehistory Research Series, Indiana Historical Society*, Vol. 2, No. 3, Indianapolis, 1941, p. 181.

[2] Charles C. Willoughby, "The Turner Group of Earthworks, Hamilton County, Ohio," *Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University*, Vol. 8, No. 3, Cambridge, 1922.

[3] John C. McGregor and Thorne Deuel, personal communication.

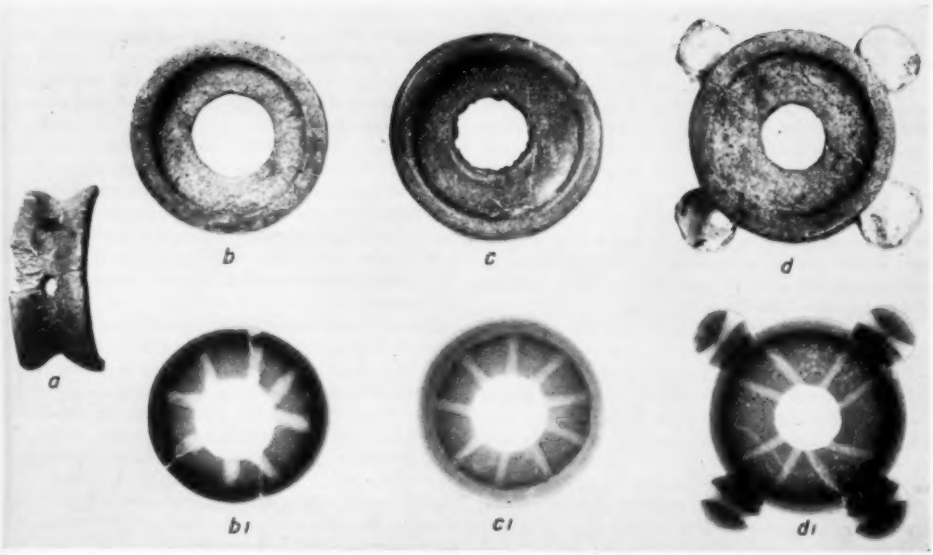

FIG. 31. Ear spools (?) from Hopewell burials in Illinois.

grouped in four pairs. The ninth is somewhat isolated and there is ample room for a tenth which, if present, would have made five pairs.

A Jersey County, Illinois example was in the Rubel collection at Grafton, Illinois. It is made of limestone tempered pottery, $1\frac{3}{4}$ in. in diameter and 9/16 in. thick. It contains seven holes quite uniformly placed.

The Davenport, Iowa Public Museum found a specimen in one of their local Hopewell mound groups, which is listed in their catalog as a "Ceremonial Badge." It is made of a gray-black pottery, $1\frac{3}{4}$ in. in diameter and $\frac{3}{4}$ in thick. It has eight evenly spaced holes, as illustrated in a drawing submitted by the late John H. Bailey.[1]

A fragment representing about one-third of an entire pottery specimen and estimated to have seven holes was found by Mr. Gregory Perino on the bluffs overlooking the Kaskaskia River between Mascouta and Fayetteville, Illinois. Two other pieces from southern Illinois have been mentioned to me but not in sufficient detail to report.

All of the pieces reported were in a Hopewellian association. The location of the perpendicular holes in all of them and the location of the four beads around the periphery of one speak against their being ear spools, especially of the type that would have been buttoned into an elongated lobe. The fact that less than half of them were found at the side of the skull or neck might also be interpreted as speaking against ear ornamentation. Since we have nothing constructive to offer, we would be glad to hear from anyone with ideas as to the possible use of these objects.

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St. Louis, Missouri
December, 1949

[1] John H. Bailey, personal communication.

ATLATLS, BOWS AND ARROWS, PICTOGRAPHS, AND THE PECOS RIVER FOCUS

In a recently published article,[1] Herbert C. Taylor, Jr. points out that there is pictographic evidence in the vicinity of the mouth of the Pecos River for the placement of the bow and arrow with a more recent stage of culture than the full Pecos River Focus. I have given considerable attention to this very problem and feel that not only is Taylor's view correct but that it needs emphasizing.

That there were at least two foci represented in the cultural remains found commonly in rock shelters in western Texas has long been recognized.[2] Kelley, Campbell, and Lehmer recognized two such foci, the Pecos River Focus and the Chisos Focus, and presented evidence for the stratification of the latter over the former, at least in the Big Bend region.[3] The later Chisos Focus persisted until *circa* 1200 A.D. and probably considerably later, since classic El Paso Polychrome sherds have been found in a number of its components.

[1] Herbert C. Taylor, Jr., "A Tentative Cultural Sequence for the Area about the Mouth of the Pecos," *Bulletin of the Texas Archaeological and Paleontological Society*, Vol. 20, pp. 73–88, Abilene, 1949.

[2] Thus, E. B. Sayles proposed the recognition of a Pecos River Cave Dweller, a Big Bend Cave Dweller, and a Hueco Cave Dweller; E. B. Sayles, "An Archaeological Survey of Texas," *Medallion Papers*, No. XVII, Globe, 1935, pp. 63–72.

[3] J. Charles Kelley, T. N. Campbell, and Donald J. Lehmer, "The Association of Archaeological Materials with Geological Deposits in the Big Bend Region of Texas," *West Texas Historical and Scientific Society Publication*, No. 10, Alpine, 1940. In the opinion of the present writer Sayles' Hueco Focus represents Chisos Focus (Big Bend Cave Dweller) components with a relatively high percentage of trade items obtained from the Jornado branch of the Mogollon.

The atlatl survives in the Chisos Focus but nocked cane arrowshafts and occasional stone arrowpoints appear in the same deposits as those containing atlatl equipment. This is not surprising inasmuch as the Livermore Focus, a contemporary of the early part of the Chisos Focus, and the Bravo Valley Aspect, which came into existence toward the close of the period of the focus, both had the bow and arrow as their principal weapon. The arrowpoints found in Chisos Focus components consistently belong to these cultures, or in the extreme north and west to the Jornada Branch of the Mogollon.[4] Thus, the bow and arrow may have become familiar to the people of the Chisos Focus as early as *circa* 900 A.D., one guess-date for the appearance of the Livermore Focus in the Big Bend.

The question of the presence or absence of the bow and arrow in the earlier Pecos River Focus is much more important. General archaeological and geological evidence indicates that this focus equates in time with the Round Rock and Clear Fork foci of central Texas and may have existed over a period of several thousand years.[5] If the bow and arrow existed side by side with the atlatl in the Pecos River Focus their antiquity in America would appear to be great. However, since in most archaeological cultures of the Americas the bow and arrow were used in fairly recent times only, this point must be examined with great care.

On first inspection the bow and arrow apparently belongs with the Pecos River Focus. Small arrowpoints, nocked arrowshafts, or fragments of bows have been reported from such classic Pecos River Focus sites as Fate Bell shelter,[6] Murrah cave,[7] and the Shumla caves.[8] Setzler states furthermore:

> The most important artifacts of this nature consist of the following fragments: the proximal end or handle of an atlatl decorated with criss-cross lines; atlatl shafts, foreshafts, and bunt-points. . . .
>
> Associated with these were many cane arrowshafts and long slender wooden arrow foreshafts, pointed and tapered at one end to receive the projectile point. In one of the Pecos River Caves we found the nock end of a wooden bow. Some of these nocked shafts and foreshafts were found at a greater depth than the atlatl fragments. This probably indicates that both the bow and arrow were used contemporaneously by the inhabitants of these caves.[9]

But further examination of the evidence raises some doubt. In Fate Bell shelter the number of remains of arrows and arrowpoints found was very small compared to the number of dart points and other indications of the use of the atlatl. The only clue to the position of arrow remains in the cave stratigraphy is a statement that "the nock ends of broken arrowshafts were found at depths of 5 and 6 inches at 148–68 (depth of deposits about 95 inches) and 160–65 (depth of deposits 99 inches)."[10] This suggests that the arrows belong to the end of the occupation of the cave and are recent intrusives.

At Murrah Cave, Holden found arrowpoints and one arrow foreshaft. The site is apparently a classic Pecos River Focus component otherwise, and Holden states that no cultural stratigraphy was discovered. However, the arrowpoints are Bravo Valley Aspect and Livermore Focus types and in all represent only 0.04 per cent of all the projectile points found, so it seems likely that the specimens are late intrusives.[11]

At the Shumla caves numerous nocked arrowshafts and small arrowpoints were found and again it is stated that only one culture is represented from top to bottom of the deposits. However, other items found, such as split-stitch basketry and squash seeds, usually occur in the Chisos Focus, suggesting that a higher stratigraphic position for the bow and arrow might have been detected if horizontal as well as vertical controls had been used, because it is stated that ". . . very small points . . . were found only close to the entrances of the caves. . . ."[12] Again, the arrowpoints pictured belong to the Bravo Valley Aspect or the Livermore Focus.

All of the above evidence suggests that the bow and arrow in the Pecos River Focus was very late or that the specimens represented may belong to a temporary late occupation of the shelters. However, Setzler's statement (see above) would seem to leave this conclusion open to doubt. Unfortunately his work has never been reported in detail, so that it is impossible to check his excavation methods or detect indications of a late occupation.

Thus, while the evidence from excavated sites suggests that there may have been both an early and a late occupation of the caves of the lower Pecos River-Rio Grande area, to which belonged respectively as dominant weapon types first the atlatl and then the bow and arrow, this conclusion is not a certain one. But when the pictographic evidence is checked there seems to be ample confirmation of the hypothesis, as Taylor has pointed out.

Taylor discusses three styles of pictographs found in caves of the lower Pecos River region. His third style, those depicting late historic items such as firearms and U. S. Army officers, are not of interest here but his first two styles are significant.[13]

One style of pictographs appears to be restricted almost entirely to the region wherein the large Pecos River Focus components are concentrated and there is a close associa-

[4] *Ibid.* For a discussion of the Jornada branch see Donald J. Lehmer, "The Jornada Branch of the Mogollon," *University of Arizona Bulletin*, Vol. 19, No. 2, Tucson, 1948.

[5] See J. Charles Kelley, "The Cultural Affiliations and Chronological Position of the Clear Fork Focus," AMERICAN ANTIQUITY, Vol. 13, No. 2, pp. 97–109, 1947, for a discussion of the probable age of these cultures.

[6] J. E. Pearce and A. T. Jackson, "A Prehistoric Rock Shelter in Val Verde County, Texas," *The University of Texas Bulletin*, No. 3327; *Anthropological Papers*, Vol. 1, No. 3; Austin, 1933.

[7] W. C. Holden, "Excavation of Murrah Cave," *Bulletin of the Texas Archaeological and Palaeontological Society*, Vol. 9, pp. 48–73, Abilene, 1937.

[8] George C. Martin, "Archaeological Exploration of the Shumla Caves," *Big Bend Basket Maker Papers*, No. 3, San Antonio, 1933.

[9] Frank M. Setzler, "A Prehistoric Cave Culture in Southwestern Texas," *American Anthropologist*, Vol. 37, No. 1, pp. 104–10, Menasha, 1935.

[10] Pearce and Jackson, 1933, *op. cit.*, p. 31.

[11] Holden, *op. cit.*, 1937, pp. 54 and 69, and Pl. 8, *A*, *13–16*. Kelley and Campbell (*op. cit.*, 1940, p. 146, Note 217) point out that use of a different type of stratigraphic control might have revealed stratigraphic difference within the deposits in Murrah Cave.

[12] Martin, *op. cit.*, 1933. See pp. 26, 27, 55, 85, 86, 91, and Pls. X and XIX. Martin tries to explain the appearance of the arrows together with the atlatl by postulating that the nocked arrows were used with light atlatls. But other excavators, such as Setzler, have found bows as well as arrows.

[13] Taylor, *op. cit.*, 1949, p. 78.

tion of such pictographs with these components. In several Pecos River Focus components the older pictographs in this style, where there are several superimposed sets of paintings, lie beneath the level of the midden accumulation, other more recent ones above it. There seems to be no reasonable doubt that the pictographic style may be referred to the Pecos River Focus.[14]

The pictographs represent conventionalized depictions of men and animals, some naturalistic depictions of animals, particularly the cougar, and many conventionalized designs whose significance is obscure. They are painted in black, two shades of red, orange, yellow, and white. Long stretches of rock shelter wall are covered with a maze of overlapping pictographs, some very dim, some fresh and bright. The individual figures range in height from a few inches to more than 10 feet. Group scenes, usually portraying dancing masked human figures or hunting episodes are common. Many of these pictographs have been copied or photographed and various accounts published by such assiduous and careful workers as Forrest Kirkland[15] and A. T. Jackson.[16] Unfortunately no thorough analysis of the cultural significance and nature of the pictographs has as yet been made. In a forthcoming publication I will point out that in all probability this art style expresses pictorially the existence of a well organized ceremonial hunting cult.[17]

One of the most common representations in this pictographic style is that of a man wearing a robe and a mask-headdress (Fig. 32). In his right hand he carries an atlatl with a feathered dart in throwing position.[18] Usually a peculiar shaped object suggestive of a tree branch or prickly pear leaves is shown on his right forearm. On his left arm near the body is an object which varies considerably in nature, but which in general appears to be a circular or rectangular hide shield, a fold of animal skin, or an object suggestive of the bolas. Next to this, on the left arm or grasped in the left hand, appears a number of extra feathered darts similar to that shown in place with the atlatl, and immediately adjacent a number of curved club-like objects suggestive of the curved fending sticks or clubs found

FIG. 32. This is an example of the pictographic representations of the conventionalized hunter, carrying atlatl and dart, extra darts, rabbit sticks (?), and other unidentified objects, characteristic of the art style of the Pecos River Focus. This example is found on the wall of Panther Cave, on the Zuberbueler Ranch, near the mouth of Seminole Canyon. The total height of the figure itself is over 10 feet. The central panel is painted in a cream color, while the remainder of the painting is in red.

FIG. 33. An example of the more recent pictographs of the Pecos River region. This painting is found in a rock shelter in Painted Canyon on the Zuberbueler Ranch, only a mile or so from Panther Cave. It is one of a group of paintings of human figures engaged in shooting arrows from bows at game animals. All the figures of this type are in red and all are painted over much older, dimmer paintings in black, which show hunters with atlatls in the Pecos River Focus style.

[14] Indeed, carefully prepared bars and balls of the pigments used in the pictographs occur in the refuse attributable to the focus.

[15] Forrest Kirkland, "A Study of Indian Pictures in Texas," *Bulletin of Texas Archaeological and Paleontological Society*, Vol. 9, Abilene, 1937, pp. 89–119; "A Description of Texas Pictographs," *Idem*, Vol. 10, 1938, pp. 11–40; "Indian Pictures in the Dry Shelters of Val Verde County Texas," *Idem*, Vol. 11, 1939, pp. 47–76; "A Comparison of Texas Indian Pictographs with Paleolithic Paintings in Europe," *Central Texas Archaeologist*, No. 3, Waco, 1937, pp. 9–26.

[16] A. T. Jackson, "Picture Writing of Texas Indians," *The University of Texas Publication*, No. 3809; *Anthropological Papers*, Vol. 11; Austin 1938. Also see Pearce and Jackson, *op. cit.*, 1933.

[17] *A Prehistoric Hunting Cult of the Pecos River Focus*, MS, 1949.

[18] Kirkland calls the atlatl and dart in these depictions a "broken flowering plant." That the darts shown in place with the instrument are actually darts cannot be doubted, however, since they are repeatedly shown piercing animals. The atlatl is just as obviously that, therefore.

so frequently in the midden debris. Finally there is an upright staff or bundle of staffs, often quite long, with either a banner or a broom-like mass at the top, and with one or more lines, suggesting cords, running from it with an upward inclination, often for some distance, to a peculiar object whose nature or function is unknown. This is often an oval bag-like object covered with hair-like appendages and with long lines radiating from the ends and often from the four "corners" as well, in some instances suggesting in appearance an animal pelt. With minor variations, such human figures, often wearing animal headdresses and masks suggestive of deer or eagle heads etc., and often having belts with tassels attached, occur in great numbers in the paintings, and are frequently shown engaged in hunts, usually against deer. The weapon carried is always an atlatl and dart. I have found no instance of the depiction of the bow and arrow in pictographs of this style.

Human figures carrying or using the bow and arrow are represented in a number of instances in the lower Pecos River region and over a much broader area as well. The style of the pictographs is quite distinct (Fig. 33). The paintings are usually in solid red, less frequently in solid black. The human figures are shown either in profile or in full face. In the later instance they usually have both arms raised at the sides with the elbows flexed. The bow is held in one hand while the other hand is usually empty but may grasp a club-like object or carry a rope-like pendant object. The figure itself is depicted naturalistically, albeit crudely, with rounded head and body. Usually these figures lack masks and are shown engaged in hunt scenes with deer and other animals. In this pictographic style the deer are usually shown life size in proportion to the human figures, while in the earlier Pecos River style they are shown very small while the associated human figures are very large. In the recent style there is a complete lack of the elaborate array of conventionalized designs and elements associated with the human and animal figures of the older style. Quite often, however, horses or other indications of historic contact appear in the bow and arrow style depictions; never in the Pecos River Focus style. Where both styles occur in the same rock shelters the bow and arrow paintings are superimposed upon the Pecos River Focus pictographs.

Thus, the pictographic evidence confirms the hypothesis already developed from a consideration of the other archaeological evidence. Evidently the Pecos River Focus hunters and warriors used the atlatl and darts but not the bow and arrow since the latter weapon is conspicuously absent from the many depictions of hunting scenes attributable to the focus. Conversely, the relatively sparse representations of bows, arrows, and actual arrowpoints in the rock shelter deposits need not be referred to the Pecos River Focus but to the later culture responsible for the naturalistic depictions of hunters carrying such implements. In view of the fact that stone arrowpoints, when they occur, are types belonging to either the Bravo Valley Aspect or the Livermore Focus, the latter style of art may be attributable either to those cultures or to a shallow late cave occupation similar to the Chisos Focus of the Big Bend region. At any rate the bow and arrow appears to be very late in the region, the atlatl early, conforming to the general American picture rather than representing a radical departure from it, as might have been concluded if the bow had proven to be an integral part of the Pecos River Focus.

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BOOK REVIEWS

Maranga: contribución al conocimiento de los aborígenes del Valle del Rimac, Peru. JACINTO JIJÓN Y CAAMAÑO. Quito, Ecuador, 1949. 511 pp., 213 figs., 31 plans, 114 pls.

The site of Maranga is composed of four principal pyramids and numerous smaller constructions, and is located between Lima and the port of Callao, Peru. In 1925, Dr. Jijón y Caamaño excavated for four months at this site, which was slightly known previously through the work of Middendorf,[1] who called it "Huadca," and Uhle,[2] who called it "Aramburu." Kroeber[3] also excavated at the site during the period of Dr. Jijón's work.

Dr. Jijón investigated the four pyramids. In No. I he encountered an intrusive Late Chancay period cemetery, and enough sherds in the base pyramid to identify its contemporaneity with the last construction phase at No. III. No. II produced meagre results. No. IV, while appearing to be an extension of No. III, was shown to be a distinct construction which had also been used for a late cemetery. The major work at Maranga was at Pyramid III (see the author's Fig. 1 and Plan I), described below.

Pyramid III has steep terraced sides and several top platforms, the highest of which is 30 m. above the level of the valley flats. Three cemeteries were encountered around this construction, one pertaining to the Proto-Lima period, the others to the Late Chancay. The largest stratigraphic cut was on the western slope of the pyramid (Plan I), and extended to its base, revealing several building phases. A ground plan of these excavations is included (Plan II) as well as a series of cross sections, of which the most comprehensive is Plan III. The construction analysis presents a sequence of adobe types: small, handmade parallelopiped adobes set in clay plaster; mold-made cubical adobes, finished by hand; mold-made parallelopiped adobes; and, for the Late Chancay period, puddled adobe or tapia. The cross sections show layers of ash, some of which may have resulted from deliberate firing for clearing out rubbish; small core pyramids set at intervals and filled between with rubble or stone; many refuse layers; room, retaining, and terrace walls; and sections of the main pyramid.

The chapters in the report are as follows: Part 1, excavations including descriptions of graves and their contents; Part 2, ceramics, treated in terms of styles, vessel shapes, rim forms, and designs; Part 3, textiles; Part 4, miscellaneous artifacts, and Part 5, conclusions. Throughout the chapters a general chronological framework is followed, and detailed discussion of the Andean distributions is incorporated.

As an aid to the reader, I have assembled the chronological information from several parts of the report in one chart (Table 7). Maranga presents two basic divisions, the first called Proto-Lima, the second Late Chancay. The Proto-Lima includes the periods called "Interlocking," "Early Lima," and "Nievería" by other authors. The Proto-Lima covers five Rimac valley periods, I to V, determined by analysis of the stratigraphic levels. Only Cemetery III is assigned to the Proto-Lima division. Maranga presents no evidence of coast Tiahuanaco (Rimac Period VI) and was apparently abandoned before it was re-used as a cemetery in the Late Chancay period.

Before presenting a résumé by periods, the ceramic styles of the Proto-Lima series must be reviewed, since these are basic for the temporal and distributional analysis. Eleven styles are distinguished, and the characteristics and distribution of each described. Here, as elsewhere in the report, the major sites for comparison are Pachacamac,[4] Nievería,[5] and Chancay.[6]

1. W-on-Bl (Pls. I–V). Simple designs in thick white paint on a dirty black base slip. This style is not found at Nievería or Chancay and is rare at Pachacamac.

2. Two to Three Colors-on-Bl (Pls. VI–VIII). White, red, and sometimes yellow paint on a black slip. The style is not found at Nievería but is reported from Chancay and Pachacamac.

3. Bl-on-R (Pls. IX–XI). Thick ware with curvilinear black designs on a red slip base. This is not found at Nievería or Chancay (although Uhle mentions it for the latter), but is described as a distinctive style at Pachacamac. The Maranga distribution suggests an early position.

4. W, Bl-on-R (Pls. XII–XXIII). This is the dominant style at Maranga and basic in all Proto-Lima sites except Nievería.

5. Three Color Negative (Pls. XXIV–XXXIII). Two-color resist painting with a third color added is common at Maranga. While not specifically mentioned for other Proto-Lima sites, Dr. Jijón believes he can identify it from the published illustrations in all except Nievería. He proposes the three-color negative for a new "horizon" style, centered in the northern Andes.

6. W, Bl, R-on-O (Pls. XXXIV–XXXVII). This is a late style at Maranga but is typical of Nievería, and also found at Chancay and Pachacamac.

7. Cajamarquilla (Pls. XXXVIII–XLIII). Dr. Jijón uses this name for the Nievería style with orange base slip and polychrome designs. It represents the acme of Proto-Lima ceramic art and reflects Nazca influence. It is a late style

[1] E. W. Middendorf, *Peru*, Vol. 2, pp. 79–96, Berlin, 1894.

[2] Max Uhle, "Uber die Frühkulturen in der Umgebung von Lima," *Proceedings, XVI International Congress of Americanists, 1908*, pp. 347–70, Vienna, 1910.

[3] A. L. Kroeber, "Culture Stratifications in Peru," *American Anthropologist*, n.s., Vol. 28, pp. 331–51, Menasha, 1926; "Coast and Highland in Prehistoric Peru," *American Anthropologist*, n.s., Vol. 29, pp. 625–53, Menasha, 1927.

[4] W. D. Strong and J. M. Corbett, "A Ceramic Sequence at Pachacamac," *Columbia Studies in Archeology and Ethnology*, Vol. 1, No. 2, New York, 1943.

[5] A. H. Gayton, "The Uhle Collections from Nievería," *University of California Publications in American Archaeology and Ethnology*, Vol. 21, No. 8, Berkeley, 1927; R. d'Harcourt, "La céramique de Cajamarquilla-Nievería," *Journal de la Société des Américanistes de Paris*, n.s., Vol. 14, pp. 107–18, Paris, 1922.

[6] G. R. Willey, "Excavations in the Chancay Valley," *Columbia Studies in Archeology and Ethnology*, Vol. 1, No. 3, New York, 1943; A. L. Kroeber, "The Uhle Pottery Collections from Chancay," *University of California Publications in American Archaeology and Ethnology*, Vol. 21, No. 7, Berkeley, 1926.

TABLE 7. RELATIONSHIP OF RIMAC PERIODS TO STRATIGRAPHIC LEVELS AND CONSTRUCTION PHASES AT MARANGA III

Rimac Periods	*Maranga: Stratigraphic Levels and Cemeteries in Pyramid III*	*Maranga Construction Phases*
VII. Late Chancay	Cemetery V	Phase V
	Cemetery IV	Phase IV
VI. Tiahuanaco	(Not represented at Maranga)	
V. Cajamarquilla 2	Cemetery III 1. Above clay floor *m* (Plan III) 2. Above clay core F–F′ (Plans II and III) 3. Ancient fill above *g* (Plan III) 4. Refuse between walls U–V, T′–S′ (Plan II)	Mixed Phase III, 3rd Epoch
IV. Cajamarquilla 1	5. Layer *d* (Plan III) 6. Fill below *b* and over *f* (Plan III) 7. Layer *f* (Plan III) 8. Fill below *f* and *g* (Plan III)	Phase III, 2nd Epoch
III. Interlocking	9. Layer *h* (Plan III) 10. Layers *i* and *j* (Plan III)	Phase III, 1st Epoch
II. Maranga 2	11. Layer *k* (Plan III)	Phase II
I. Maranga 1	12. Layer *n* (Plan III)	Phase I

TABLE 8. PERCENTAGE OCCURRENCE OF PROTO-LIMA CERAMIC STYLES IN RIMAC PERIODS AT MARANGA III

Rimac Periods	*Maranga Levels*	*Proto-Lima Ceramic Styles*											*Miscellaneous Ceramic Styles*						
		1. W-on-Bl	*2. Two-to-Three Colors-on-Bl*	*3. B-on-R*	*4. W, B-on-R*	*5. Three Color Negative*	*6. W, B, R-on-O*	*7. Cajamarquilla*	*8. Bucchero*	*9. Two Color Negative*	*10. Cream, Bl-on-R*	*11. W-on-R*	*Late Chancay Styles*	*Epigonal*	*Mold Decorated*	*Mochica*	*Nasca V*	*Miscellaneous*	*Totals*
VII. Late Chancay	1–2	5.4	7.4	7.0	43.1	17.0	4.4	4.6	1.1	1.2	3.2	0.6	1.7	1.1			0.5		179
V. Cajamarquilla 2	3–5	9.5	9.1	9.7	37.0	21.9	5.4	3.2	0.5	0.3	1.4	0.6	0.5		0.6			0.4	368
IV. Cajamarquilla 1	6–8	8.3	9.9	9.4	37.1	16.8	3.4	8.6	0.4	1.5	2.2	1.2				0.4			153
III. Interlocking	9–10	13.1	10.3	15.0	28.2	26.7	3.0			0.5	3.0								183
II. Maranga 2	11	10.8	7.7	13.8	38.5	27.7					1.5								65
I. Maranga 1	12	4.0		24.2	49.5	18.2					2.0							2.0	99

at Maranga, and is not found at Chancay nor in the Strong and Corbett cuts at Pachacamac. It is, however, typical of Nievería and occurs in graves at Supe, Middle Ancon I, Huacho, and Pachacamac, frequently associated with Epigonal style pieces.

8. Bucchero. Polished blackware is rare at Maranga but occurs in Proto-Lima collections elsewhere.

9. Two Color Negative (Pls. XLIV–XLV). Resist painting without a third color is both rare and late at Maranga. It is not found at Nievería, but occurs at Pachacamac and Chancay (although in the White-on-Red period, which precedes the Interlocking).

10. Cream, Bl-on-R (Pls. XLVI–XLVII). This style is possibly a local variant of the W, Bl-on-R, and at least is hard to identify in illustrations of other collections.

11. W-on-R (Pl. XLIX). Dr. Jijón considers this style to be a variant on the Chancay W-on-R, although it is late at Maranga.

Ceramics in the Proto-Lima levels at Maranga which are not of the above styles are extremely rare. They include two

unusual coffee-on-yellow fragments (Pl. L, *1–2*), and red engraved, proto-Chimu (Mochica), Nazca Y, and mold decorated pieces.

The percentage occurrences of the Proto-Lima ceramic styles in the Rimac periods represented by stratigraphic levels at Maranga are presented in Table 8. Some slight discrepancies in the percentages reflect minor typographical errors in the text which are difficult for a reviewer to correct, and also my liberty in reducing the figures to one decimal place.

Throughout the monograph, Dr. Jijón identifies ceramic styles and artifacts with the various construction phases at Maranga, and ultimately correlates these with the major Rimac periods. It is possible, then, to present a summary in terms of the Rimac periods at Maranga, together with Dr. Jijón's conclusions on the relationship of each to other Proto-Lima sites.

I. Maranga 1. The earliest level at Maranga represented a period before the construction of the major pyramids. Walls were made of small hand-made adobes of irregular shapes set in clay plaster. Two adjoining rows of small rectangular rooms had walls 25 to 50 cm. thick which stood 60 cm. to 1.3 m. in height. The small rooms, roughly 1.8 m. on a side, contained no doors or windows, a fact which suggests to Dr. Jijón that they were either granaries or cult quarters. No burials were found, and, aside from ceramics, the only artifact was a pointed human femur, which Dr. Jijón identifies as a trophy. The ceramic styles were limited to the "W-on-Bl," "Bl-on-R," "W, Bl-on-R," "Cream, Bl-on-R," and "Three Color Negative," but these are sufficient to identify the period with the Proto-Lima division. The known distribution of this period is limited, since the ceramic styles are not found at Nievería, in Pyramid I at Maranga, nor in Uhle's grave finds at Pachacamac. The basic ceramic component is, however, represented at Chancay and at Strong and Corbett's cut at Pachacamac, although associated in these sites with later styles.

Dr. Jijón thinks the Maranga 1 finds are the earliest yet isolated in the Rimac valley, and estimates their date as 450 A.D. There is no doubt that the inhabitants were agriculturists, since maize, kidney beans, lima beans, and peanuts were all associated.

II. Maranga 2. The second period at Maranga is essentially a development of the first. Several retaining walls were associated, as well as one which looked like a terrace of a pyramid. The adobes were hand made, measuring 174 by 67 by 97 mm. No burials were associated. The non-ceramic artifacts include a cotton bag with brocaded decoration in wool and a small clay figurine with upraised arms. In one cut (Plan IV) was a balsa canoe of *totora*, like the Titicaca ones. It measured 5.4 m. in length and was wrapped in reed mats that might have been used for sails. One new ceramic style, "Two to Three Colors-on-Bl," is added to those previously known. Again the distribution of the period is limited, although the new ceramic style is found at both Pachacamac and Chancay.

III. Interlocking. The third period levels at Maranga were separated from those of the second by extensive ash beds. Dr. Jijón thinks these may have been the result of deliberate burning of rubbish to clean up and level off the site before starting new construction. The walls were of mold-made adobes finished by hand, which measured 160 by 68 by 130 mm. No burials or non-ceramic artifacts were associated, except a perforated stone club head. Two new ceramic styles are added, "W, Bl, R-on-O," which suggests Recuay or Nazca influence, and "Two Color Negative."

The Interlocking levels at Pachacamac and Chancay are assigned to this period, which suggests a time of expansion. Dr. Jijón sees evidence of strong political organization, warfare, and sierra influences in this period. Likewise, a close relationship to highland Recuay is seen in the interlocking designs on ceramics and in the "Three Color Negative" style.

IV. Cajamarquilla 1. At Maranga this period was one of large scale building activity, including the construction of Pyramids Nos. I and III. The adobes were both mold made and finished by hand, and true mold made. There were large open rooms with the walls plastered and painted yellow. Non-ceramic artifacts were not numerous, but included examples of brocade and tapestry cloth, coil baskets, and a wooden dish carved in fish shape. The "Cajamarquilla" ceramic style, with suggestions of Nazca Y influence, "W-on-R," of better quality than at Chancay, and "Bucchero" are added to the ceramic series. The first sherds of Mochica style also appear.

Although graves were not definitely associated, Cemetery III, which belonged in general to the fifth Proto-Lima period, contained three types of burials. Graves of the first type, with extended skeletons, either face up or face down, seemed to be somewhat earlier, and also contained ceramics of the "Bl-on-R," "Bucchero," "Cajamarquilla," and "W, Bl-on-R" styles, which would suggest a placement in Period IV.

The Nievería site was first occupied in this period, and the ceramic styles are represented in graves at Pachacamac. However, the refuse cuts at Pachacamac and Chancay contain no materials which would suggest that their occupation continued into the period.

V. Cajamarquilla 2. The final occupation at Maranga by peoples of the Proto-Lima division is represented by this period. Quite a variety of building and refuse deposits were associated. The adobes were all mold made, measuring 135 by 120 by 130 mm. Cemetery III showed the grave types. Direct burials were flexed on the side, and there were secondary burials of piles of bones and isolated skulls. Textiles were common, some from mummy wrappings, and included brocade, tapestry, gauze, embroidery, knitting, netting, braiding, gingham, batik, warp stripe, and painted cloth. There were both coil and plaited baskets, double pointed wooden spindle shafts, a bone weave dagger, stone polishers, clay pan pipes, a sculptured mouthpiece of a flute, a wooden idol, hollow clay figurines with stub legs like Gallinazo types, and rag dolls. The graves also contained a human scalp, the mummy of a dog, and a pointed human femur trophy.

There were no new ceramic styles of the Proto-Lima series, but the presence of Nasca Y and Middle Cañete styles is consistent with the Nievería finds. There were also some rare fragments of Mold Decorated, Epigonal, and

Chancay styles, but these probably represent a later mixture. By the close of this period the main center of development had apparently shifted from Maranga to Nievería and other sites.

VI. Tiahuanaco. The absence of Tiahuanaco or Epigonal styles, and the lack of influence of these on the Proto-Lima ceramics at Maranga indicates that the site was abandoned, although the culture continued at Nievería, Pachacamac, and Ancon. Maranga was subsequently used as a cemetery in the Late Chancay period, but in the intervening times there is no evidence of occupation. It is interesting that the Pachacamac excavations by Strong and Corbett show a similar gap between the Interlocking and Inca periods without evidence of Tiahuanaco occupation.

VII. Late Chancay. Although Dr. Jijón is primarily concerned with the Proto-Lima division of Maranga, he describes in detail the cemeteries and artifacts from the Late Chancay graves at the site. The graves have seated flexed burials, wrapped as mummies, and contain almost exclusively Late Chancay ceramic styles, some of which show Chimu and Inca influence. The artifacts are varied and include copper and silver objects, which are not mentioned for the Proto-Lima periods. Likewise, double cloth, tie dye, and feather mosaic are added to the earlier weaving techniques.

The over-all report furnishes a wealth of detailed information on this important Proto-Lima site, which has only been sketched in this review. The chronological interpretation presents a convincing framework for the Rimac Valley sites, but the extension of this to include Chancay raises some problems. In Chancay, Willey established a stratigraphic sequence of a Chancay White-on-Red period, followed after a transitional phase by an Interlocking period. Dr. Jijón treats this sequence as if it were basically one period. His own interpretation is that the Chancay White-on-Red represents a local culture in that valley, contemporaneous with the Proto-Lima (Interlocking) in the Rimac Valley. With the expansion of Proto-Lima in Period III, the Chancay style was superseded. Final judgment on this question depends on whether future work will isolate a White-on-Red level underlying the Interlocking in the Rimac Valley.

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Field Archaeology. R. J. C. ATKINSON. London: Methuen and Co., Ltd., 36 Essex Street, Strand, W.C. 2, 1946. 238 pp., 8 halftone pls., 87 diagrams.

The English point of view toward archaeological techniques is given in an elementary manual about pocket size. The author's aim is to give an outline of general principles and methods of research in archaeology, which are universally applicable. The manual is well written, easily read, and has a good index.

Although the author professes that he is writing the book for the amateur student, it would be well worthwhile for the trained student and professional archaeologist to open its covers. This reviewer would not go so far as to say that it should be a "must" on the shelf of the American archaeologist, but it might not be a bad idea to see what our British cousins are doing. The problems and solutions of technical aspects in English archaeology are practically identical to ours when specific cases are similar. It is interesting to learn how the British archaeologists tackle problems especially related to Britain.

The author was prompted to write the book with the intention of summarizing archaeological techniques which, as he says, most students of archaeology had to pick up piecemeal with little direct instruction in field methods. In the Introduction, the history of archaeology in Britain is briefly traced and the works of the more important archaeologists of the past are described. In the same section the author also discusses the future of archaeology, archaeological training, field work, and excavation under these headings. The latter three subjects are described more fully in the main body of the text.

The body of the book is divided into four parts, viz.: Part I, "The Search for the Evidence"; Part II, "The Record of the Evidence"; Part III, "The Interpretation of the Evidence"; and Part IV, "The Publication of the Evidence."

In reading this manual, the American student might be surprised to learn that (p. 34) he is adjured to visit the nearest inn for information as part of the preliminaries of excavation. Perhaps, in England this might be a good suggestion; our local substitute in the United States, on the other hand, may not be the locus of the same sort of sympathetic advice.

"Bosing," or thumping the ground with a weighted rod for distinctive echoes, and surveying with a camera may be two techniques not heard of on this side of the ocean, certainly not publicized. Although the measurement scales are not those which are generally used in the United States, the ideas are the same in principle. One should always keep in mind that the book was written for British students of archaeology and that there will be some differences in nomenclature. The latter do not pose insurmountable obstacles to our understanding, however.

A method of viewing vertical profile sections may or may not be a new one to the American student (pp. 129–30). It is claimed that by viewing the section upside down, that is standing with your back to the section, bending down, and viewing it between the legs, it is frequently possible to notice details not apparent to the normal view. If this method will wring additional data out of a profile section, it should be adopted by all means. It must be confessed that this reviewer has not tried the idea out for himself, as yet.

Parts III and IV, "The Interpretation of the Evidence" and "The Publication of the Evidence," are two rather important sections for the budding archaeologist. We are in agreement that archaeological method does not stop with the mere excavation of material data. Fellow archaeologists in the field should have some acquaintance with the facts uncovered by their colleagues. Through whatever publication medium chosen, the data should be made available in concise and simple terms. A point to keep in mind, as the author notes, is that the archaeologist must "look beyond

his potsherds and post-holes to the proper subject of his study, the man who made and used them" (p. 177). This statement has a not unfamiliar ring.

In "The Publication of Evidence," English phraseology and usuage of terms are not, as previously mentioned, precisely the same as those used by the American, but the principles are essentially similar.

Supplementing the foregoing, there are a six-page glossary of archaeological terms and three briefer appendices entitled: "The Cleaning and Restoration of Finds," "Treasure Trove," and "Experimental Techniques." A six-page "Select Bibliography" refers the reader to amplified detail of this exposition from the British sources.

It is hoped that an American counterpart of this manual will be written, something sorely needed in the United States, since the serious amateur has no general guide to follow. Serious amateur archaeological exploration, properly guided, is of value to others and worthy of recognition. Although it may seem a bit awkward to recommend the British manual to the American student, it might suffice until a good, general American manual is written.

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Ancient Man in North America. H. M. WORMINGTON. Denver Museum of Natural History, Popular Series, No. 4, third edition, revised 1949. With appendix *Geology of the Clovis Sites* by ERNST ANTEVS. 198 pp., 21 figs., 2 tables.

This compact publication supersedes all general summaries to date of important contributions to the study of Early Man in North America from Alaska to the Valley of Mexico. The period covered is from *ca.* 25,000 years ago to *ca.* 2,500 years ago. This brings to a focus the terminal date of that era in which we regard the American aborigine as Ancient Man, or the better known cliché, Early Man.

The book is divided into four major sections under the following headings: (1) Stone Industries, (2) Areal Survey, (3) Skeletal Remains, (4) First Peopling of America. Several examples will suffice to illustrate the importance of this volume. In the section on "Stone Industries," Table I helps in clarifying "Yuma" projectile point typology. The term "Yuma" is dropped and a single term designation given by geographical location, i.e., Eden point, or, as in one case, by the general shape of the point, i.e., Long point. Table II, contained in the section titled "First Peopling of North America," is a summary of the more important types of ancient projectile points, their characteristics, and estimated ages from one, or if discrepancies in age evaluation do exist, from several published sources. To have these projectile types all in one section and the various ages in bold print as "years old" is indeed enlightening or disturbing, depending on one's fixity.

The book is liberally illustrated by drawings and photographs of projectile types. It also contains a short glossary, a comprehensive bibliography, and an index. Maps depicting the location of major sites are lacking, and would have been useful.

Miss Wormington has again accomplished the epitome of summarization of a large mass of data of popular interest. This is a book written primarily for the layman, but it is useful for students in all levels of academic work and forms an excellent quick-reference handbook for the specialist in the field of Ancient Man. The value of this work is further enhanced by the diligence of the author in seeking out and publishing summaries of important researches yet unpublished in a detailed and comprehensive manner.

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Excavations in Northeastern Massachusetts. RIPLEY P. BULLEN. Papers of the Robert S. Peabody Foundation for Archaeology, Vol. 1, No. 3. Andover, Mass.: Phillips Academy, 1949.

Bullen's "Excavations in Northeastern Massachusetts" is a classic contribution to New England archaeology. It convincingly demonstrates what can be done with limited data and relatively unimpressive sites by the exercise of sound methodology and analysis, coupled with a full awareness of the problems involved and a mind free of prejudices and preconceived notions.

His survey covers 67 sites in the Shawsheen Valley and one on the coast at Ipswich 20 miles to the east. While most of the stations were extremely small and offered little evidence of value, eleven of the sites (including Clark's Pond shell heap) were of a fair order of magnitude, yielding through excavation a consistent repetition of data which, taken *in toto*, seem amply sufficient to sustain Bullen's deductions.

The soil profile at the inland sites comprised an upper zone of dark brown loam, happily in most instances never plowed, underlaid successively by an upper yellow-brown or red-brown sand and a lower yellow-brown sand or loose sand and gravel. A high degree of stratigraphic and typologic (including material of chipped implements) correlation was observed on the Shawsheen Valley sites. Bullen's generalized sequence for these sites revealed "that at an early period [corresponding to the lowest stratum] many corner-removed points, a few straight-stemmed points, expanded base drills [all of deeply patinated felsite derived from the coast, or of gray slate], and semi-lunar knives were made. In an intermediate or transitional period [represented by the lower portion of the middle stratum] the same artifacts are found [with some quantitative differences] and, in addition there are small triangular and small-stemmed points [chiefly of local quartz], asymmetric trianguloid knives, gouges, pestles, and impure graphite. At the very end of this transitional period [upper middle layer] corner-removed and straight-stemmed points are not found, but points with wide notches at the sides do occur, as do sherds of coarse mineral-tempered pottery [the first to appear], usually decorated[1] by means of cord- or textile-wrapped paddles. The final period [corresponding to the loam] is characterized by many triangular points, medium and

[1] The reviewer would consider this a surface finish rather than a decoration, but he agrees with the author in identifying it with the Vinette 1 type of New York.

large [prevailingly of slightly patinated felsite]; a few large lanceolates and points which have narrow notches at the sides; soft graphite; and potsherds of coarse mineral-tempered ware, vegetable-tempered wares,[2] which tend to become the dominant form, and some fine mineral-tempered vessels" (pp. 73–4).

Speculating on the problem of cultural continuity or succession on the major Foster's Cove site, Bullen finds, on the basis of his graph of vertical distribution of stone artifacts (Fig. 5), that "the lesser frequencies at the base of the loam suggest a hiatus. The fact that the deepest pottery is found at about this level, and that, except for those discussed above, there is a lack of small triangular, stemmed, or corner-removed points at higher levels, is suggestive of a sudden break in the history of the site" (p. 33). He is apparently undecided on this point, however, for elsewhere, in a general discussion of the Shawsheen Valley sites, he states: "There is little evidence of any great break in cultural continuity. At no sites were the culture-bearing zones separated by extensive sterile layers. While different types of projectile points came into use at the time when pottery was introduced, the change from small to large triangular points was not a radical one. . . . The overall picture is one of cultural continuity with new traits added and others dropped over a period of time" (p. 79). As so many of the sites are very small he concludes that "apparently the favored small sites were occupied by a few people over a long period of time, either continually or intermittently. Minor variations between the inventories of material culture from nearby sites, such as Foster's Cove and Camp Maud Eaton, suggest the possibility of intermittent occupation, a periodic changing from one site to another" (p. 79).

Bullen believes that the progression established for the Shawsheen Valley in general parallels that in Connecticut, Rhode Island, New York, and, indeed, the eastern United States as a whole. He suggests that the cultures of eastern Massachusetts developed from the same Archaic base, excluding the Lamoka, which underlies those of the entire Eastern area. He remarks on the similarity of his earlier congeries with the Laurentian, and there can be no denying that the preceramic assemblage at Hofmann's, Foster's Cove, Camp Maud Eaton, and elsewhere accords very closely with the core complex of the Laurentian, as defined by the reviewer for New York. Its regional expression as the demonstrably basic Archaic manifestation of northeastern Massachusetts comes as no surprise to him.

Bullen's investigations in a limited section of the northeastern area have once more shown the cogency of the seriation of basic stages of cultural change revealed by other students of the eastern United States. The expectable local variations occur, but the configuration as a whole is unmistakable. Bullen has injected new hope into the pessimistic outlook for New England archaeology current in some quarters, and it seems safe to predict that the extension of this kind of research will ultimately make possible regional correlations within and beyond New England, resulting in a fuller picture of the prehistorical events in this portion of the United States.

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[2] This is not to be confused with the much earlier fiber-tempered ware of the Southeast.

The Excavations of Ste. Marie I. K. E. Kidd. Toronto: University of Toronto Press, 1949. 191 pp., with text figs., maps, pls., appendix, index, and bibliography. Red cloth cover, $6\frac{3}{4}'' \times 9\frac{1}{2}''$.

Ste. Marie I is the site of a Roman Catholic mission which was intimately connected with an event that every anthropologist working in eastern North America heard about before he began his graduate work—the expulsion of the Hurons from their homeland by their Iroquois cousins to the east. This mission was founded by the Jesuits in 1639 and set afire and abandoned ten years later when it became evident that it would certainly be destroyed by the Iroquois. The ruins were recognized as of French origin in 1789, the author states, and in 1844 were identified as the Ste. Marie I of the Jesuit Relations and other contemporary documents. It was partly excavated by a Jesuit priest in 1855, but there were no other operations until those described in this report, a joint enterprise of the Royal Ontario Museum and the Jesuit order, occupying two seasons in 1941 and 1942. Excavations were limited to the area of the European compound, enclosed by masonry curtains, and the remains of the residence and chapel.

The first thing that interests an archaeologist in work of this sort is whether, in the absence of historical record, the site could have been identified as a religious establishment. The answer will not indicate whether Adena and Hopewell mounds resulted from special cult activities, and in any event the answer is negative. The mission had two main structures, one described in the report as the residence, the other as the chapel. The residence was the larger, and three fireplaces, a refuse pit, and indications of a second story served easily to identify it as domestic in purpose. The smaller ruin also contained a fireplace at the north end, the back wall of which formed one of the three sides of one of the four bastions of the compound. The objects found consist of European material such as nails, an iron wedge, an ax and a spearpoint of iron, a copper pin, and two glass beads. The native Indian materials were a stone celt, a few potsherds, and a flint scraper. From the hearth floor, and unquestionably contemporary with the building, were recovered a large number of animal bones, charred plum pits, and beans. There was nothing to indicate a special religious function, but the position and size, and the apparent lack of a second story, best fitted the ruin for identification as the chapel described in the contemporary writings. The entire ruin, taken as a whole, would look even less religious in purpose than the chapel, with its bastions, moats, and the position on relatively high ground. But while the bastions, three of them connected by a masonry wall, do suggest military operations, the moats were constructed mainly for drainage and, since they connected with the Wye River, as a basin for boats, the only objects found within the compound that indicate out-and-out weapons are the parts of a

sword-hilt and a fragment which may have been the tip of a sword-blade. One of the plates shows also a small cannon which was taken to Christian Island after abandonment of the mainland site, and found there in recent times.

The European specimens found comprise a wide variety of iron carpentry tools, and axes, knives, forks, kettles, and hoes for culinary and agricultural use. There were also gun parts, iron fishhooks and spears, but no metal horse trappings, no iron traps of any kind, and no strike-a-lights. Of ornaments there were brass bangles, a ring, copper bells, rosettes and pendants, and two medallions, one inscribed to Ignatius Loyola before his canonization and bearing his likeness on both faces. A cross of four bone beads strung on silver was obviously part of a rosary, and two small iron bells are of the kind used in Roman Catholic ceremonies. The photograph of a restored vase of Venetian origin and beautiful proportions is featured in the frontispiece. The vase was found in fragments in a storage pit.

The native Indian materials were small in number and consist of potsherds, an antler ladle in effigy of a duck's head, the tip of a bone harpoon or point, pieces of pigment, a fragment of textile, nearly a hundred chert specimens including a drill and some scrapers, and one fully-ground stone celt. All are assigned to the Hurons except the celt, which the author believes to have been carried there by Algonquian Indians, perhaps after abandonment of the mission. There was no European flint, and no gun flints were found although fragments of flintlocks were excavated. The elbow type of pipe seems to be the only one indicated, and the potsherds show narrow chevrons at the rims, with occasional crosshatching, punctation, and other characteristic impressions. No entire pots were found but the general shape was globular, with or without castellations, and without deep neck constriction. There were 72 potsherds made according to native methods and apparently from local clay, but not in native styles. Some appear to have been thick cylindrical containers of some sort and one is evidently a shallow bowl. Decoration is said to be simple, but it is not described.

As to oversights, a minor one is the failure to state in exact terms the distance of Ste. Marie I from the shore of Georgian Bay, though it is described as about a mile from the mouth of the Wye River. Further, while it is stated on page 85 that "in 1941 the water-level in the Wye stood at 578 feet," the general reader would be unable to be certain that this was the same, for all practical purposes, as the level of Georgian Bay, for the latter figure (officially 579.7 feet in 1939) is not explicitly given anywhere in the book. By geological reckoning of the rate of tilt of the Great Lakes basin since Nipissing Great Lakes, the surface of Georgian Bay and therefore of the Wye River at Ste. Marie I, should have been around 6 feet higher 300 years ago. It is extremely interesting that Mr. Kidd, on finding the surface of the Wye at 578 feet, says that "if there were to be any water at all in the moat system, the river level would have to be at least 6 feet higher than in 1941" (p. 85). The water at that level would have made a lake of what is now a swamp south of the site, and the existence of this lake is confirmed by Father Lalemont's description in 1640, quoted by Mr. Kidd on page 10.

The primary interest of the Roman Catholic Church in this work was to obtain data for the reconstruction of Ste. Marie I. But as Mr. Kidd points out, much detailed information was recovered which fills in the gaps in the writings contemporary to the occupation of the mission. This publication will serve prehistorians in eastern North America by defining new types of European goods for the decade 1639 to 1649, and this provides a means of dating native goods which has not yet been worked out in the detail that it deserves. The large number of animal bones found have not yet been identified, but it is expected to be done in the near future and that the results will be published.

There are 51 excellent plates, 31 text figures, 12 maps. A good many of the artifacts are shown both by drawings and photographs, but the glass beads and native pottery only by simple line drawings which, except for color, are probably better than photographs. Altogether this is a very readable account, and a well-printed, easily-handled volume. The horizontal grid plan employs the numeral and letter coordinates, and is admirably simple for use during excavation and in describing locations of the various features in textual description. The horizontal unit of excavation was 5 feet, the vertical 3 inches. The map of the plan of excavations is the only oversize page in the book, but it opens with only one fold, allowing for convenient reference during reading.

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Maria, the Potter of San Ildefonso. ALICE MARRIOTT, with drawings by MARGARET LEFRANC. Norman: University of Oklahoma Press, 1948. xxi+294 pp., illustrated. $3.75.

The tired anthropologist who wishes to relax for a few hours of pleasant reading, will find this book a good companion. The story is entertaining and absorbing, the style simple and agreeable. The delicate sketches by Lefranc lend additional charm to the volume. The story deals with the life of Maria Martinez, a Tewa woman of San Ildefonso pueblo, New Mexico, who has become widely known through her part in the revival of the Pueblo pottery craft, the abundant and excellent pottery which she has produced, and through her gracious personality.

The reviewer could well close with the remarks above and left the book stand on its merits as literature, were it not for certain statements by the author and publisher. In the foreword and elsewhere, Marriott refers to her activities in gathering data for the volume as being those of an ethnologist, and addresses the volume, in part at least, to ethnologists. On the dust jacket and in promotional releases, the publishers indicate that the intention is to present the book as an ethnographic study. If so, then it must be reviewed as such. On this basis it has much of merit to recommend it, but also has certain shortcomings.

Concerning the nature and purpose of the book, the author says (p. xii) that it

> . . . is not a formal history of the pueblo of San Ildefonso or of the life of Maria Martinez. What has been attempted here is an exposition only of certain events. What happened is told informally, as a story, and as often as possible in Mrs. Martinez' own words.

The volume then is not a biography or an ethnography of conventional pattern. The reader will not find a detailed biography of the nature of those of Left Handed, Sun Chief, or Old Mexican. Neither is it an ethnographic account of San Ildefonso, such as is offered by Whitman.[1] Its chief value is in the illumination of the disintegrative forces acting on San Ildefonso and individual reaction to these. The personality of Maria is well portrayed through a series of lightly-brushed sketches of incidents in her life, presented in roughly chronological order. The volume is particularly revealing concerning the part played by Maria, and her husband Julian, in the revival of pottery making at this pueblo. But one should not expect to find a full account of San Ildefonso pottery making such as is presented by Guthe,[2] or as complete a report of the Pueblo pottery revival as those of Kidder and Halseth.[3]

A stream-of-consciousness method of interview was followed, with minimum questioning and checking. This results in a certain spontaneity and offers many interesting and intimate side-lights, but gives very uneven coverage and reduces coherence. The volume is presented as primary data without attempt at integration with previous publications through documentation. There is a terminal bibliography or reading list of about fifty titles, but comparative material from these is not introduced into the text.

It is exceedingly surprising to note the complete omission of any mention of the exhaustive study of San Ildefonso pottery manufacture published by Carl E. Guthe.[4] In discussing the meager literature on the pottery revival, Marriott (p. 291) comments that it is "a source of deep regret" to her "that more such records were not published." Yet she seems oblivious of this study, which was made in 1921, almost at the beginning of the manufacture of the black-on-black pottery, and contains considerable information on this development. Guthe's volume is based to a large extent on the work of Maria, who was his chief informant. It contains a fine portrait of her as a frontispiece, photographs of her at work, and many illustrations of her pottery.

Marriott (p. xi) intimates that the reactions of Maria are those of the average Pueblo woman. It would appear, on the contrary, that she was about as atypical as could be found. Her success was precisely in accepting and adjusting herself to the rapid changes which were taking place and in exploiting the unusual abilities of herself and her husband. She was the first to take up commercial pottery manufacture, first to obtain a cook stove, a sewing machine, and a station wagon. She gave pottery demonstrations in St. Louis, Santa Fe, San Diego, Chicago, New York, Washington, and San Francisco. One of her sons became a college-trained engineer, and another married outside the pueblo in modern manner. Her annual income was estimated by Kidder at $2000.00 and by Halseth at about $3600.00.[5] This was hardly the life of the average Pueblo woman, those about whom no books have ever been written. That Maria inwardly shrank from these changes and deplored them, does not in any way alter the fact that she adapted herself to them, however reluctantly.

Marriott's work at San Ildefonso was carried out with official permission of the governor and the council of the pueblo, under a number of stipulated interdictions, which she accepted and with which she abided. She was forbidden to inquire into such subjects as native religion, clan and moiety systems, political functions, and the schism within the town. For this reason, she states (p. xii) that ethnologists "will find blanks in the work at the very places where they most desire information." This is certainly most true, for without treatment of such strong cultural forces as Pueblo child training, Pueblo religion, and the impact of the closely knit social and political systems, the account is essentially removed from its Pueblo context. Also, by virtue of the elimination of these native influences, outside forces such as Christianity, government schools, and government officials loom out of their due proportion.

The effects of these restrictions are particularly notable in her brief references to the split in the pueblo. In one place (p. 289) she refers to the split as occurring from "an unknown cause," but elsewhere (pp. 10–12) hints at its causes but concludes that what caused the break "no one but the people of San Ildefonso will ever truly know." This reveals the effects of the limitations of her method of operation. Whitman,[6] working without such restrictions, found very real causes for this split and discussed them freely. Whether his conclusions are correct is beside the point here. The recording of a reasoned and plausible answer is better than placing the matter in the category of occult and unknowable.

Marriott implies that any alternative method of collecting data would have involved "trickery" and would have resulted in "unreliable" data (p. xii). This is a serious indictment of many workers in Pueblo ethnology. Are we to brand as unreliable and throw out the works of such persons as Parsons, White, and the Stevensons because they did not always work under formal permission? Shall anthropologists accept the method recommended by Marriott and be content with the present body of data on Pueblo religion and socio-political systems? I cannot believe that obstacles to field work today are any more insurmountable than they were when Bourke was thrown bodily out of a kiva at Santo Domingo, or when Tillie Stevenson was imprisoned in one at Oraibi, or when Cushing cooly defied and stood off a group of threatening men at Oraibi. Perhaps reliable information cannot be obtained by trickery, but it can be gathered by clandestinely establishing close personal relationships with individuals and lubricating this with money. It has also been demonstrated in the past that data *can* be obtained by stealth, bluff, and threatening to call out the U. S. Cavalry. However, dubious the ethics of such methods, they have obtained data, and

[1] William Whitman, *The Pueblo Indians of San Ildefonso, a Changing Culture*, New York: Columbia University Press, 1947.

[2] Carl E. Guthe, "Pueblo Pottery Making, a Study at the Village of San Ildefonso," *Phillips Academy, Papers of the Southwestern Expedition*, No. 2, New Haven, 1925.

[3] A. V. Kidder, "Introduction," pp. 1–15, in Guthe, *op. cit.*; Odd S. Halseth, "The Revival of Pueblo Pottery Making," *El Palacio*, Vol. 21, No. 6, 1926, pp. 135–54.

[4] Guthe, *op. cit.*

[5] Kidder, *op. cit.*, p. 14; Halseth, *op. cit.*, pp. 136–7.

[6] William Whitman, "The San Ildefonso of New Mexico," in, Ralph Linton (editor), *Acculturation in Seven American Indian Tribes*, New York: D. Appleton-Century Co., 1940, pp. 390–460. See pp. 431–9.

these are not necessarily unreliable. It remains to be shown that data of comparable breadth and value can be obtained by the approach advocated by Marriott.

Marriott (pp. xix–xx) makes what seems to me a very remarkable statement concerning her attitude toward San Ildefonso:

> Like any working ethnologist, I am prejudiced in favor of the people with whom I have worked and from whom I have gathered information. Like any working ethnologist, I should like to see an Indian culture in which I have become absorbed preserved from outside influences for time and eternity. Like any working ethnologist, I should like to build a wall around that culture, so that no prying eye but mine should ever watch its workings.

Whatever her own sentiments, it hardly seems just to attribute to all ethnologists such an emotional and unscientific attitude, and such an aversion to having one's work checked by others. A highly subjective attitude with such feelings of jealousy are hardly conducive to furthering the more serious purposes of ethnology.

These are a few of the comments which seem to me to be justified if this book is to be represented as an ethnographic contribution. They do not bear on its quality as literature. In the latter respect, it is an excellent volume, the reading of which I enjoyed very much.

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Textiles of Pre-Columbian Chihuahua. LILA M. O'NEALE. Contributions to American Anthropology and History, Vol. 9, No. 45; Carnegie Institution of Washington, Publication, No. 574, pp. 95–161. Washington, 1948. Frontispiece and 16 pls., 14 text figs., map, 9 tables.

This publication reports the exhaustive study, by the late Miss O'Neale and several of her former associates, of a series of 32 archaeological textiles from Chihuahua. The efforts of a number of individuals are embodied in the report. Much of the basic study was by three graduate students, Grace C. Beardsley, Sally F. Domoto, and Fay P. Olwig. Fiber identification was by Prof. Herbert L. Mason. Photography was by Victor G. Duran, and drawings by Ruth L. Dibble. Dr. Michael Kasha prepared an appendix (pp. 151–7) reporting his analyses of dye materials. Dr. A. V. Kidder presents a brief foreword (pp. 99–100), devoted chiefly to a discussion of the archaeological provenience of the textiles. There is a tribute to Miss O'Neale by Margaret W. Harrison (p. 96).

The findings of this group are presented in excellent format, with abundant illustrative material consisting of collotype plates, sketches, and tables. The textiles are described minutely with details presented on such aspects as yarns, weaves, selvages, thread counts, texture, stitchery, mending, eyelets, decoration, and colors. The appendix by Kasha reports exhaustive analysis of the dyes, carried out in part by the photoelectric spectrophotometer method. The study is primarily descriptive with less attention given to integration of the findings with previous data on textiles and textile techniques of the Southwest and northern Mexico. The interpretations are more theoretical and more speculative than perhaps would have been true if more attention had been given to comparison.

The general conclusions are that the fibers were exclusively of *Apocynum cannabinum*, spun into yarns without the use of the spindle, by twisting on the thigh under the palm of the hand. The textiles are considered to have been woven on wide, stationary looms, similar to those of the southwestern Indians. Weaves are simple over-one-under-one (plain plaiting) warp face, with no pattern weaving (twilling). Ornamentation is sometimes affected by stripes and brocaded figures in color. The textiles are rectangular, untailored fabrics, produced for practical purposes and reveal considerable wear and mending. Colors are in several shades of red and black, produced by such vegetable dyes as indigo and alizarin, and some mineral pigments. Rather complicated dyeing processes are postulated, involving mordants, acids, and fermentation.

This study is perhaps the most meticulous and detailed investigation of textiles from an American site yet presented. One can hardly quibble with it as an exercise in textile technology. But even such an excellent study carried out in a vacuum would have little meaning. In view of the great amount of time, labor, and expense which must have gone into the prosecution and publication of this research, it seems pertinent to inquire what contributions it makes to the history of technology and to the solution of archaeological problems. It is evident immediately that its value in these respects is discounted considerably by the unfortunate fact that almost nothing is known of the origin of the textiles. They cannot be attributed with assurance to any particular site, time period, or archaeological manifestation.

The only documentary data on the textiles consist of two letters from their presumed collector.[1] The identity of the collector was not revealed, as he was a citizen of Mexico who brought the textiles into the United States as contraband. In the foreword, Kidder quotes from these letters to the effect that the textiles are said to be from a cave in the Sierra Madre of southwestern Chihuahua, three days on horseback from Creel (see map, p. 104). This would seem to place the cave in the upper Rio Fuerte drainage, in the country of the Tarahumara. The textiles are said to be wrappings from desiccated bodies, and the blankets in turn had been covered with twilled matting. Some of the bodies are said to have been pierced with arrows. Even these scant data must be taken on the word of the anonymous gentlemen who smuggled the textiles out of Mexico in order to sell them.

Kidder interprets the textiles as likely of the Rio Fuerte Basket Maker horizon. This interpretation is based chiefly on the absence of references in the letters to associated pottery or habitations, and the absence of cotton in the textiles. Kidder remarks on the meager knowledge of the archaeology of Chihuahua with which to correlate these materials, and his suggestion of a Basket Maker date is admittedly speculative. Unfortunately, neither the kind of burial practice nor the typology of the textiles seem specifically diagnostic of any particular period.

Burial in caves of bodies wrapped in blankets seems to

[1] Prof. E. W. Gifford, Director, Museum of Anthropology, University of California, has kindly furnished me with copies of these letters.

have been practiced in southwestern Chihuahua since Basket Maker times and has continued to very recent times. Lumholtz, in traveling through that country between 1890 and 1900, observed a number of caves with such burials. Some of these appeared ancient, but others were still in use by the Tarahumara. Lumholtz describes the modern Tarahumara method of cave burial in some detail. He also mentions that many of the caves had been disturbed by "treasure seekers" and others, and that even at that time many were "much spoiled for research."[2] Bennett and Zingg also described Tarahumara cave burial practiced as late as 1930–31, and, incidentally, do not mention any association of pottery. They also describe burials of the Basket Maker period. In both instances the bodies were wrapped in blankets and placed in caves.[3] The difficulties in dating burial wrappings from caves in that area are therefore apparent.

Lumholtz describes and illustrates modern Tarahumara textiles which have at least a general similarity to those studied by O'Neale and her associates.[4] The theoretical method of manufacture of the Chihuahua textiles, as described by O'Neale, coincides fairly closely with that of the modern Tarahumara, as described by Zingg.[5] O'Neale cites a number of instances in which this similarity is noted. The dyeing methods involving indigo inferred by Kasha correspond closely with Tarahumara dyeing with indigo, introduced by the Spanish.[6] The typology of the Chihuahua textiles, therefore, offers little clue to the age and associations of the textiles. It might be remarked, however, that the complicated dyeing processes inferred by Kasha would seem to have been somewhat over the heads of the Basket Makers or other early peoples.

The possibility that the Chihuahua textiles might actually be of the historic period should not be dismissed entirely. Kasha noted that, in the ashing in crucibles of the fibers of two of the specimens, there was a bubbling of tarry organic matter with the odor of burning hair (pp. 152–3). This is precisely the action of wool under the same conditions. Such a burning test appears in some keys for fiber identification as a means of distinguishing between fibers of animal origin and those of plant origin. The latter burn cleanly and give off an odor of burning paper or wood. If animal fibers were present, they were not necessarily those of the domestic sheep. But the above circumstance and the evidence for a complex indigo dyeing process, offer at least a suggestion that possibly the wool of domestic sheep and introduced Old World indigo might have been present. This would naturally indicate that some of the textiles were manufactured in historic times.

According to O'Neale (p. 97), the fibers of the textiles were identified as "Apocynum" by Prof. Herbert L. Mason, Curator of the Herbarium, University of California. No species identification was attributed to Mason, but in her discussion of the fibers (p. 113), O'Neale infers further that the fibers were of the species *Apocynum cannabinum*. This inference is apparently based on the reported use of fibers of this species by Indians elsewhere. If the fibers were truly Apocynum, this is of exceedingly great interest and significance as evidence of change in natural conditions, or of importation of the fibers into the area. According to Woodson[7] and other authoritative sources, no species of Apocynum now grows in the area from which the textiles are presumed to have come. The nearest source of supply would be about 150 miles to the north. No data are presented as to the methods followed in identifying the fibers or as to the diagnostic features on which the identification is based. These become very desirable and pertinent in view of the non-occurrence of Apocynum in southwestern Chihuahua at the present, and the strong suggestion from Kasha's observations that some hair may be present. I wrote to Prof. Mason (on April 21, 1948) concerning these points and offered to compare notes and microscope slides from my own tentative examination of fibers from similar Chihuahua textiles, but have received no reply.

Whether or not the identification of Apocynum from these textiles is correct, it may not be out of place here to comment on the growing use of the term "Apocynum" in reference to fibers from sites in the Southwest and northern Mexico. This term is appearing in an increasing number of publications, and generally is not supported by an identification from a botanist competent in fiber identification. Apparently the term "*Apocynum cannabinum*" in archaeological literature in general is losing all specific and generic association. It seems to have come to be applied to any soft, finely macerated fibers which do not appear to be wool, cotton, or coarse leaf-fibers, without any reference to actual botanical origin. If so, this is an unfortunate and misleading use of a specific plant term and should be avoided. I am acutely aware of the scarcity of fiber specialists and the difficulty of obtaining competent identification of archaeological fibers. But unless or until expert assistance is available, it would be highly advisable to be content with some descriptive term rather than one implying a particular species or genus as the source of the fiber.

The strictures which have been offered here are not intended to detract from the study as an excellent and thorough one in textile technology. My purpose is only to point out that the ultimate value of this work will have to rest largely upon the extent to which the time period and association of the textiles can be clarified by future investigations. It may not be out of place to suggest that, in view of the considerable expense already involved in the study, a few hundred dollars placed in the hands of a graduate student for work in Chihuahua might lead to the answer of a number of questions concerning the textiles.

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[2] Carl L. Lumholtz, *Unknown Mexico*, Vol. I, New York: Charles Scribner's Sons, 1902. See pp. 223, 327, 382–3 in particular.

[3] Wendell C. Bennett and Robert M. Zingg, *The Tarahumara*, Chicago: University of Chicago Press, 1935. See pp. 236–9 and 357.

[4] Lumholtz, *op. cit.*, pp. 259 and 274 in particular.

[5] Bennett and Zingg, *op. cit.*, pp. 90–7.

[6] *Ibid.*, pp. 157 and 170.

[7] Robert E. Woodson, "Studies in Apocynaceae, I," *Annals of the Missouri Botanical Garden*, Vol. 17, Nos. 1–2, 1930, pp. 1–212. See pp. 89–1 and Pl. 1, opp. p. 174.

NOTES AND NEWS

DISCOVERY OF BONAMPAK

Question has been raised as to the discovery of the Maya ruins of Bonampak in Chiapas, Mexico, the walls of one of whose temples bear remarkable mural paintings. Such information as is available to the Division of Historical Research of Carnegie Institution of Washington, which in cooperation with the Instituto Nacional de Antropología e Historia of Mexico sent expeditions to Bonampak in 1947 and 1948, indicates that the site, known from time immemorial to the Lacandone Maya and long used by them as a place of worship, was first visited by a non-Indian on February 9, 1946, when the late Mr. H. Carl Frey was guided by a Lacandone. Although Mr. Frey observed a number of structures, the bush was so dense that he did not hit upon the temple containing the paintings. In May of the same year, Mr. Giles G. Healey, then engaged in making a moving picture of Maya ruins and the living Maya for the United Fruit Company, was also guided by Lacandones to Bonampak, where he found and photographed the painted temple. Thus, credit for the discovery of the site, but not of the murals, belongs to Mr. Frey, who lost his life in 1949 on an expedition to Bonampak of the Mexican Instituto de Bellas Artes. (*A. V. Kidder.*)

VIKING FUND AWARD

The 1949 Viking Fund Prize and Gold Medal in Archaeology have been awarded to Hallam L. Movius, Jr., of the Peabody Museum, Harvard University. Dr. Movius won the award for his many significant contributions to Old World prehistory as expressed in the following citation:

HALLAM LEONARD MOVIUS, JR.

For his notable enlargement of our Palaeolithic horizons, particularly in his series of publications: "Early Man and Pleistocene Stratigraphy in Southern and Eastern Asia," *Peabody Museum Papers*, Vol. 19, No. 3, 1944; "The Lower Paleolithic Cultures of Southern and Eastern Asia," *Transactions of the American Philosophical Society*, Vol. 38, Pt. 4, 1948; and "Lower Palaeolithic Archaeology in Southern Asia and the Far East," *Studies in Physical Anthropology*, No. 1, 1949. In these reports Movius has produced the first synthesis of the Palaeolithic archaeology of Asia and developed a new culture complex for the region, distinct from the classical cultures of Europe. The reports indicate a keen insight into archaeological problems as well as wide acquaintance with the literature. The contribution is important, not only as a synthesis and interpretation of the archaeological material, but also in presenting related geological and palaeontological data.

In addition, his earlier work is of outstanding merit: at Mt. Carmel in Palestine and five field seasons devoted to Stone Age sites in Ireland. His most recent researches, a resurvey of the Palaeolithic of Western Europe and an analysis of the extensive new literature on Stone Age sites in Russia and Siberia extends his grasp of the Palaeolithic from ocean to ocean east to west across the entire land mass of Eurasia and from the Mediterranean to the Arctic seas.

The above citation was delivered by J. O. Brew, President of the Society for American Archaeology, at the Viking Fund dinner for presentation of the awards, which was held at the Waldorf Astoria Hotel, New York City, on February 10, 1950.

THE VIKING SEMINAR ON THE EXCAVATION, PRESERVATION, AND IDENTIFICATION OF ARCHAEOLOGICAL DATA

This meeting was held in New York on March 24 and 25 at the Viking Fund Headquarters. The seminar was planned to stimulate interest in and to diffuse information about archaeological techniques and thus was in a sense a pump-priming experiment. It was necessary to limit the attendance to a relatively few individuals, since an open meeting would have overtaxed the resources. Those who were invited were in a key position to help stimulate the growth of interest in new applications of science to archaeological work or were themselves developing particular phases of these applications. The papers presented at this meeting are to be published in a single volume along with a digest of the discussion following the various papers. This volume will be available as soon as the necessary editorial work is completed.

The first paper was by Albert C. Spaulding on "Recent Advances in Surveying Techniques and their Application to Archaeology." It was emphasized that the simplest and fastest surveying techniques which would provide the required accuracy were the only necessity, and that the greatest possibility for increased efficiency lies in a better understanding of the fundamental application of plane surveying, both in theory and working techniques. Techniques for measuring distance and direction, such as the tie line survey, plane table, compass, and transit, were next called to the attention of the group. Practices with regard to the rectangular grid system were discussed, with emphasis upon variations which would be of value. Spaulding's paper concluded with a discussion of the utilization of aerial photographs as an aid in surveying.

The next paper was by Waldo R. Wedel on "The Use of Earth Moving Machinery in Archaeological Excavations." This paper was based on the utilization of such machinery during 1948–49 in the salvage program in the Missouri Valley. The two major machines were a small bulldozer, which was found to be effective in removing tough sod or sterile overburden, and a larger road patrol with a 10″ blade, which was able to cover a large area, leaving the dirt free and smooth. The main advantage of this machinery was that it enabled rapid exploring and clearing of sterile deposits and also efficient removal of worked-back dirt. For the amount of work time the cost was found to be relatively small. An additional advantage was that with the machines it was possible to clear rapidly village site areas so that the settlement patterns of Woodland, Upper Republican, and Pawnee cultures were easily observed and proved to be distinctly different. In conclusion, Wedel stated his belief that, if the machines were handled by competent operators who fully understood the archaeologist's problem, little or no significant data would be destroyed.

The paper by Frederick Johnson was entitled "Geology and Biology in Connection with Field and Laboratory Investigation." In the introduction it was stated that one of

the main aims of geology was to establish a series of events on a time scale. In order for the archaeologist to take advantage of this chronological facet of geology, it is necessary that cultural objects be associated with a definite geological period or with a number of such periods. The geologist can then relate these specimens to the local geological event, which may either be itself of wide geographical significance or may be connected with a geological event of wide significance. Among various specialties mentioned by Johnson were the aid to be obtained from soil geologists, studies of pollen, and analyses of the food supply, both potential and that known to have been eaten by the natives. Various illustrations were given of the necessity of real cooperation between the specialists and the archaeologists. Both must understand the problems and limitations of the other.

The paper by Junius Bird was on "Recent Developments in the Treatment of Archaeological Textiles." No new information was given about preservation of textiles in the field. Some are of such a fragile nature that they need to be studied before any attempts are made to move them. Other specimens which are near to disintegration can sometimes be packed in their own debris and shipped to the laboratory. In certain areas, such as Peru, the amount of textile material available is so great that it is impossible to preserve all of the specimens. In situations such as this the field collector should make certain that all representative examples of all recognizably different textile forms should be brought back. Most of this paper was devoted to techniques of the preservation of specimens in the museum, and these remarks were based on the practices of the Textile Museum of Washington and on the work of Bird in handling the Peruvian textiles in the American Museum of Natural History. A number of slides were thrown on the screen to illustrate the appearance of the textiles before preservation and after they had been cleaned and mounted.

The paper by J. Webster Gettens was on "Principles in the Preservation of Mural Paintings." Gettens outlined five different methods of handling murals based on the type of support. He emphasized techniques of preserving mural paintings placed on mud walls, since this is the type normally encountered by American archaeologists. The deterioration of mural paintings is caused by structural insecurities of the walls themselves or by structural difficulties produced by superimposed layers. In addition, the designs themselves may be disfigured by exposure to the elements and by scaling and abrasion. The principles of treatment include corrections of structural insecurities, wall stabilization, or separation of the painting from the walls. The purpose of treatment is to insure the preservation of the design layer. In some cases materials and techniques have been employed which gave good results initially but over a period of time hastened the destruction of the design. Getten concluded with a discussion of various preservatives, and of their advantages and disadvantages. It was emphasized that the most important single principle in applying preservatives or adhesives is to use them in the smallest amount possible.

The paper by S. F. Cook was on the "Chemical Analysis of Fossil Bone." This was on the examination of the changes which are usually called fossilization or mineralization. An electron with a film magnification of 8000 diameters is an essential tool in this study. A bone consists of both organic and inorganic compounds and the fate of these after interment is quite different and may be followed separately. As one passes from recent to old skeletal material there is an increase in the proportion of the inorganic matter to the organic material and water in the bone. The changes which take place in the inorganic component of bone depend on the chemical nature of the matrix. This means that no universal or uniform alteration can be expected in skeletal material where age is the only factor involved. Fluoride penetration of bone reflects not only age but also the amount available in the adjacent matrix. If human and animal bone from a given site are contemporary, they both should have the same fluorine content. Up to about 25 per cent by weight of living bone is removable water. This removable water tends to decrease in proportion to the age of the bone. The organic material consists principally of fat and the protein ostein. The former goes quickly. The organic nitrogen is the most valuable for the determination of relative age, and as the bone protein decomposes during fossilization, the nitrogen disappears in parallel fashion. The organic decomposition seems to be relatively independent of the chemistry of the soil matrix. For this reason it seems to promise the possibility of providing a chronological yardstick in assessing the age of skeletal material.

The paper by W. C. Root was on "Metallurgical Analyses and their Aid to Archaeology." There are three principal procedures: spectroscopic analysis, quantitative analysis, and metallographic examination. Spectroscopic analysis is perhaps the easiest and it provides information as to the types of materials and impurities represented in the specimen. The superficial appearance of specimens can be deceiving as to their actual metallic nature. Certain specimens from Chichen Itza which were believed to be silver turned out to be tin on spectroscopic analysis. Copper beads from the Valley of Mexico have a significant proportion of lead. Those from most of the areas from Middle and Central America do not contain lead. The copper bells from Chichen Itza were found to have a lead content and are presumably, therefore, from the Valley of Mexico. Copper bells from the Southwest are relatively pure copper and conform in style as well as in purity to those from Sinaloa. The quantitative analysis will determine the composition of the analysis of gold, silver, copper, and tin. This determination cannot be made spectroscopically. The most expensive type of examination is metallographic, which can determine if the object was cast, hammered, annealed, soldered, welded, plated, or gilded. Only a small fraction of the specimen is needed, but this might cause some damage if the specimen is a showpiece.

Dr. Paul F. Titterington's paper was on "The Use of x-Ray in Archaeological Research." Archaeologically, x-Ray is one of the photographic methods. An x-Ray picture or roentogram is composed of superimposed shadows, starting in the black and going through the greys to a greater translucency. Its diagnostic ability depends upon the differentiation of the shadows, which are at times rather complex. Most of Dr. Titterington's experiments were with

a high voltage machine. With this he has been able to study drillings and other cavities in stone,[1] and also from time to time to recognize fraudulent articles such as large ceremonial blades which were composed of fragments fitted together by means of plastic compounds. It is not possible to distinguish between different metals by means of x-ray, but metals can be distinguished from stone. Some experiments were made which differentiated shell tempering from stone tempering. While this can be done, it is hardly worthwhile. The experiments indicated that it was difficult to impossible to measure the proportions of tempering material to clay by means of the x-ray. One experiment employed a very soft ray with long exposure on a container from the St. Louis Art Museum. This indicated that instead of being of wood, the specimen had been made of coiled grass. Low voltage x-rays of small tropical fish make it possible to count the vertebrae, greatly simplifying that particular task. Experimentation with low voltage and long exposure may well indicate considerable usefulness for the x-ray.

Donald Collier presented a paper on "The Present Status of C-14 Research." He reviewed the various early phases of the history of this project, which have been published by Dr. Libby and his associates. It was emphasized that the primary purpose of the research was to justify the method rather than to obtain dates for anthropology or geology. He discussed the formation of C-14 and its presence in organic material. Various errors are liable to influence the result obtained, and it has been necessary to be unusually cautious in this initial phase of the project so that results may be as accurate as possible. So far, only the rough dating method has been tried and the future work under Libby's direction will be on an enriched counting obtained by a thermal diffusion column. With this method Dr. Libby believes that it will be possible to obtain dates of specimens up to approximately 30,000 years ago. In submitting specimens it is necessary to have sufficient material to obtain 16 gms. of pure carbon. This would be enough for a single run, so that for additional checks the material should be doubled or tripled. The amount of material for a single run is as follows: plant material, such as fiber, wood, etc., a minimum of 40 gms.; charcoal, from 12 gms. to 80 gms., depending upon the carbon content of the charcoal. Peat also varies in carbon content, and the necessary amount varies between 80 and 300 gms.; various kinds of dung require 150 to 200 gms.; well preserved shell requires 120 gms.; nonfossilized antler, approximately one pound; well carbonized bone requires several pounds.

Frederick R. Matson's paper was on "Ceramic Technology as an Aid to Cultural Interpretation, Techniques, and Problems." In this review of the various techniques included within ceramic technology, Matson stressed the cultural value obtainable by this approach. There is a wide range of materials which can be included in the category of ceramics. Besides pottery and figurines, brick, glaze, glass, plaster, mortar, and cement can be studied by the ceramic technologist. The various techniques can be of value to help solve such immediate archaeological problems as the identification of materials, the objective description of the ware, and the attempted recognition of imported products. One of the major aims of ceramic technology should be to help understand the role of the potter in the community and the function of ceramic products in the culture. Eventually, it will be possible to understand the ceramic development at a particular site or in local areas over a long time period and then to integrate this with other historic developments in different areas. It will also be possible to correlate the growth and development of man's control over ceramic material with other technological developments such as his use of metals, wood, stone, basketry, or leather goods.

A paper on "Statistical Analysis of Archaeological Material" was given by G. W. Brainerd. In southern California a site survey card with a peripheral punch system for tabulating a series of some 80 traits has facilitated culture classification in the area as well as the task of tracing archaeological distributions. The success of this system depends upon the careful choice of traits. In association with Dr. W. S. Robinson of U.C.L.A., Brainerd has produced a statistical procedure which achieves a chronological ordering of groups of ceramic collections. The procedure consists of computing an arithmetic measure of similarity based upon several wares and types between each pair of collections in the group. The collections are then ordered by a codification so that those collections with the greatest similarity appear close to each other in the sequence, and conversely those collections with less similarity are separated by proportionately greater distances.

A paper "On the Use of IBM Machines in Analyzing Anthropological Data" was presented by F. P. Thieme. This paper discussed the possibility of using IBM machines and punched cards in analyzing anthropological problems. The machines are particularly valuable in certain types of anthropological research where the data are so considerable that the mere manipulation and arranging of facts presents a major problem in itself for the investigator. If this data can be placed on punch cards the machines will automatically read these perforations and perform a wide variety of operations. The majority of the operations necessary for anthropological research can be performed on various standard commercial machines. The different types of machines were discussed in terms of their suitability for various anthropological problems. Any anthropological data that can be codified into categories for which numerical symbols can be assigned can be punched and handled on these machines. They enable statistical work to be accomplished in a fraction of the time ordinarily necessary in such analyses.

Hans Lundberg gave a paper on "Possible Geophysical Aids to Archaeology." He reviewed various uses which could be made of passing electrical currents through the ground, through buildings, or through stone materials. The pattern of dissemination of the current as recorded by the oscilloscope gives different wave forms, which have identifiable characteristics. A number of illustrations were given as to the practicality of such work. Comments were made on the use of spectroscopic analysis and of ultra-violet ray in identifying particular types of materials.

The final paper was by Lolita Binns on "Recent Develop-

[1] See above, pp. 70–1. *Editor*

ments in Photography." The Polaroid Land Camera was demonstrated by taking a photograph of S. K. Lothrop. Another demonstration showed a recently developed compact case containing the equipment necessary for making microfilms. Attention was called to cardboard scales of the Eastman Company which have recorded on them color tones and values ranging from black to white. By including these in color shots or ordinary black and white pictures, it will be possible in processing to correct light and color values. Emphasis was placed upon the camera as a recording device which can distort as well as correctly reproduce archaeological information.

The concluding session was devoted to a discussion of the results of the conference and the best means of disseminating the information it produced to archaeologists and in stimulating awareness of the considerable resources not now adequately applied in field and laboratory research. Various proposals were made. It was suggested that a board of specialists might be named to whom materials could be submitted for a detailed analysis. A comprehensive field manual could be prepared which would present the essential data for the most accurate excavation and recording procedures. A graduate course could be organized, which might be called a "Tool Course," to present an outline of various devices and techniques applicable in anthropological research. A special summer school could be organized to teach a series of short courses in various fields. There was considerable sentiment that undergraduate majors in anthropology should not only have some contact with such fields as geology, botany, and zoology, but that they should also have some awareness of the basic principles and techniques in physics and chemistry. This does not mean that they should attempt the impossible task of acquiring any special efficiency in these non-cultural fields, but that they should have an awareness of the potential contribution to cultural interpretation which can be made by utilization of various scientific disciplines.

No committees were appointed to develop any of the various suggestions and to turn in reports. It was felt that the future developments should be left to individual initiative and that the value of the conference would best be judged by the results obtained in different archaeological centers through the stimulation provided by the conference. The conference chairman will welcome any suggestions as to the best means of disseminating information on developing archaeological techniques and on stimulating the development of new methods for interpreting archaeological data. It is possible that in a few years another similar conference can be held. (*James B. Griffin*, Museum of Anthropology, University of Michigan.)

SYMPOSIUM ON ARCHAEOLOGICAL CHEMISTRY

A symposium on archaeological chemistry was held during the meeting of the American Chemical Society at Philadelphia on April 11 with Dr. Earle R. Caley of Ohio State University as the leader. The following papers were presented:

1. Earle R. Caley, "Introductory Remarks."
2. Earle R. Caley, "Early History and Literature of Archaeological Chemistry." He dealt with the work done between 1785–1875, all of which was concerned with European or Asiatic material.
3. R. J. Braidwood, J. E. Burke, and N. H. Nachtrieb, "A Metallographic and Chemical Examination of Some Ancient Syrian Coppers and Bronzes." These were from excavations of the Oriental Institute of the University of Chicago at a site near Babylon.
4. William C. Root, "Alloys of Gold and Copper in Ancient America." This dealt with the probable reason for the use of this alloy in Colombia and Central America.
5. Rutherford J. Gettens, "The Corrosion Products of an Ancient Chinese Bronze." Photomicrographs of sections of an ancient bronze vessel.
6. Marie Faransworth, "Greek, Roman, and Egyptian Pigments."
7. F. R. Matson, "The Composition and Working Properties of Ancient Glasses and Glazes." These were from Egypt and Syria.
8. A. J. Sofianopoulos, "Conservation of Ancient Marble Monuments."

These papers will probably be published next fall in the *Journal of Chemical Education* and will be reprinted as a group. The symposium attracted an audience of 50–75, and it is planned to have another one next year. There was an informal dinner in the evening, followed by a discussion. The sentiments of the group were similar to those expressed at the Viking Fund seminar.[1] (*William C. Root.*)

[1] See above, pp. 85–8. *Editor.*

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GEORGE BANTA PUBLISHING COMPANY, MENASHA, WISCONSIN